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HAND-BOOK

OF

PRACTICAL PHARMACY,

BY

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Accn. No: 20824

SECOND EDITION
REVISED AND CORRECTED.

No. of Pages 420

MADRAS:
HIGGINBOTHAM AND CO.
By Appointment in India to His Royal Highness the Prince of Wales,
and to the Madras University.
1883.

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MADRAS:
PRINTED BY HIGGINBOTHAM AND CO.,
165, MOUNT ROAD.

TAMIL NADU ARCHIVES LIBRARY
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PREFACE TO THE SECOND EDITION.

A New edition of this work having been called for, every effort has been made to increase its utility as a practical guide for students of Pharmacy. The arrangement of some of the sections has been altered and various additions made, and some portions have been entirely rewritten. The chapter on Pharmaceutical Chemistry has been omitted, as the teaching of that branch, in its present development, belongs rather to the domain of Chemistry than that of Pharmacy. I have to record my thanks to the Professor of Materia Medica in the Medical College, and to Mr. Dique, Curator, Government Central Museum, for the assistance received in the correction of proof.

G. B.

Madras, 30*th April* 1883.

PREFACE.

SOME years ago, when holding the appointment of Professor of Materia Medica in the Medical College, I undertook the production of what was then and is still very much wanted, a text-book of Practical Pharmacy. At that time I had considerable leisure and hoped to finish the work in a short period; but having soon afterwards taken up other official duties which left me hardly a spare moment, its publication has been greatly delayed. Indeed, I may safely say, that nearly the whole of the work has been written and passed through the Press at hours when less busy people were enjoying their sleep. I am conscious now of many marks of imperfection in the book, which might have been avoided with more leisure at command. Of course no claim is laid to originality, and I may briefly say that I have endeavoured to bring together from all sources the best available information. Being obliged, on account of my health, to leave India for a time while the last sheets are passing through the Press, I am indebted to my friend Dr. King for much kind assistance.

G. B.

MADRAS, 15*th June* 1874.

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D

ERRATA.

Page 81, line 1, *for* ammoniaci, *read* ferri.

„ „ *under* Mistura scammonii *expunge* (for a child.)

„ 194, line 10, *for* Berberry, *read* Barberry.

„ 206, *under* Confectio sennæ, *for* 60 to 20, *read* 60 to 120.

„ 270, to Tinctura chloroformi, *add* co.

PRACTICAL PHARMACY.

INTRODUCTION.

1. Pharmacy is derived from a Greek word *Pharmakon* a medicine, and treats of the selection, preservation, preparation and dispensing of drugs. Medicines are derived from the mineral, vegetable and animal kingdoms, and some knowledge of natural history and chemistry is necessary for their due selection and preparation. The processes by which the crude substances are rendered fit for administration are called the *Operations of Pharmacy*.

2. *The Pharmacopœia* is a work prepared, by some competent authority, to serve as a guide in the selection and preparation of medicines. The one in general use throughout the English Empire is called the "British Pharmacopœia," but there is also a special one for India, containing, in addition to the articles of the British Pharmacopœia, many indigenous remedies. Every medicine included in the regular list of articles in a pharmacopœia is said to be *officinal*, and those not so recognised are termed *non-officinal*.

CHAPTER I.

Weights, Measures, and Pharmaceutical apparatus.

3. *Scales and Weights.*—In using these, the Dispenser requires a steady hand, quick eye and considerable dexterity, which last can only be acquired by practice. Every dispensary should contain two sets of scales and weights, viz., one small and delicate for weighing grains, and another larger for drachms and ounces. The former should never be used for weighing quantities exceeding a quarter of an ounce, nor the latter for quantities less than that. The balance consists essentially of a *beam* or lever, poised in the middle on a knife edged pivot, the fulcrum. At each end of the lever a scale or pan is sus-

pended. The beam is usually made of brass or steel, and the scales of brass, silver or glass.

4. *Testing Scales and Weights.*—In a good balance the two arms of the beam should be precisely equal, and the beam ought to remain horizontal when the scales are empty. On receiving new scales and weights they should be carefully tested, to ascertain if they are correct. To test the balance, suspend it carefully with the scales attached, and when it is at rest ascertain, by looking at the *tongue* or *pointer*, whether it is perfectly horizontal. If it be so the probability is that it is correct. To be quite sure it is better to weigh carefully 8 or 10 grains of sand. Then remove the sand to the scale in which the weight was placed, and the latter to that which held the sand, and if the result be the same as at the first weighing, the balance may be considered quite true. To test the delicacy of the larger and smaller balances, put in each scale the maximum quantity which the balance is capable of weighing, and if, when thus poised, the former does not turn on the addition of from 2 to 3 grains and the latter on adding half a grain, they should be rejected. At the same time it must be remembered, that common small scales, especially when old, will rarely weigh accurately a smaller quantity than 1 grain. When therefore a half or quarter grain of any powerful medicine is ordered, it is better to weigh one or two grains, and then to sub-divide this quantity with a knife on a piece of paper, so as to get the requisite amount. When scales are in frequent use it often happens, that one gets worn and lighter than the other. In that case the equilibrium must be restored, by the application of a sufficient quantity of silk thread or very fine wire to the whipping immediately below the hook which suspends the scale.

5. Before weighing anything the scales should be made perfectly clean, and after the operation they must be carefully wiped. If cleanliness be not attended to in the case of brass scales they soon get rusted or corroded, and a neglect of it when poisonous drugs, such as Strychnia or Atropia, have been weighed, might lead to fatal consequences. The balance should never be kept suspended without a weight in one scale, as the constant *see-saw* motion, which

ensues when it is left free, soon destroys the fine edge of the pivot. Both scales and weights should be carefully handled as rough usage will injure them.

6. *Weights used in Dispensing.*—The weights of the British Pharmacopœia are the avoirdupois scale, which is as follows:—

1 Grain	gr.	
1 Ounce	oz. or ℥	= 437·5 grains.
1 Pound	lb. = 16 oz.	= 7000 grains.

The small weights supplied with a balance are made of sheet brass cut into squares, each square being marked with indentations or dots in number equal to its weight in grains. It is also usual to find in sets the following weights:—

½ scruple	℈ ss.	= 10 grains.
1 "	℈	= 20 "
½ drachm	ʒ ss.	= 30 "
1 "	ʒ	= 60 "

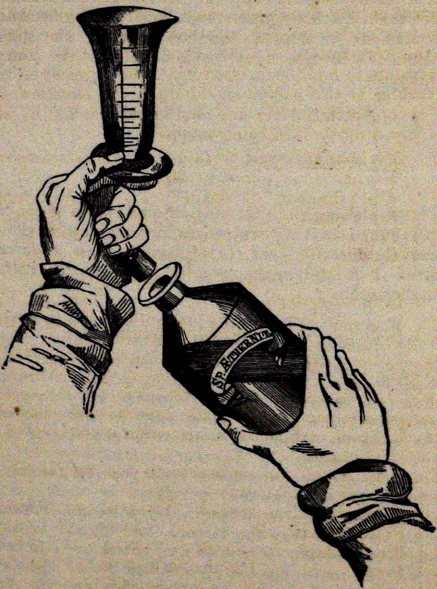
These, although not forming aliquot parts of the avoirdupois ounce, are very convenient for weighing considerable quantities of medicines. In addition to them we have also quarter, half and ounce weights, and quarter, half and pound weights.

7. *Measures.*—Fluids are usually dispensed by measure, and the utensils used for the purpose are made of glass, with the quantities engraved on the outer surface in a graduated scale. Measures are either cylindrical or conical in shape, and have a broad thick pedestal to keep them steady when placed on a table. They vary in size, the usual kinds being the minim, and one, two, four, six, eight and twenty ounce measures. In selecting a measure the chief points to be observed are that it has a good lip for pouring out fluids, that the glass is clear and not too thick and that the graduated scale is distinct. Measures are more frequently incorrect than the balance, and should be tested either by comparing them with a standard, or by measuring one or more ounces of distilled water about the temperature of 60° Fhr. and then weighing the fluid.

If the graduated scale be correct, each ounce by measure should be exactly one ounce by weight.

8. In dispensing, a measure of capacity near to that of the quantity to be issued should be employed. Thus for three ounces the four ounce measure should be used, for half an ounce the ounce measure, and so on. When measuring fluids, the pedestal of the measure should be grasped by the thumb and fore-finger of the left hand, and the other fingers carried round below it, so as to keep the vessel steady (See Fig. 1). The stopper of the bottle from

Fig. 1.



which the fluid is to be taken should then be removed by the little finger of the same hand, and thus the measure can be held on a level with the eye, and the dispenser will be able to ascertain accurately and expeditiously whether the quantity poured in is correct. In judging as to this it should be remembered, that the surface of the fluid, more especially if the measure be of small diameter, assumes a slightly concave form. Allowance must, therefore, be made accordingly, as the line where the fluid touches the glass is always slightly higher than the centre part of the surface of the fluid. Care must also be taken that the measure is held perfectly upright, which will be known by the surface of the fluid coinciding with the same marks on the two scales on the opposite sides of the glass. A further precaution is that *drops* must not be considered equivalent to minims, as the former vary greatly in volume according to the nature of the fluid, and the form of the lip of the bottle. After use the measure should be washed and wiped dry before being put past.

9. *Measures of Capacity of the British Pharmacopœia.*

1 Minim.	min. or ♏.	
1 Fluid drachm.	fl. dr. or fl. ʒ	= 60 minims.
1 Fluid ounce	fl. oz. or fl. ℥	= 8 fl. drs.
1 Pint	O (*Octarius*)	= 20 fl. oz.
1 Gallon	C (*Congius*)	= 8 pints.

Measures of Length.

1 Line = $\frac{1}{12}$ inch.

1 Inch = $\frac{1}{39{\cdot}1393}$ seconds pendulum.

12 „ = 1 foot.

36 „ = 3 „ = 1 yard.

Length of a pendulum vibrating seconds of mean time in the Latitude of London, in a vacuum at the level of the sea 39·1393 inches.

The relation of the measures to the weights of the Pharmacopœia is as follows :—

1 Minim is the measure of		0·91	grs. of water.
1 Fluid drachm	„	54·68	„
1 Fluid ounce	„ 1 oz. or	437·5	„
1 Pint	„ 1·25 lbs. or	8,750·0	„
1 Gallon	„ 10 lbs. or	70,000·0	„

10. *Weights and Measures of other Countries.*

India.—The systems of weights and measures in use in India are very perplexing, as they differ in nearly every district of the country. The scale in general use in Southern India is as follows:—

					Avoirdupois.	
				lbs.	oz.	grs.
1 Tola	=	180 grains.				
3 Tolas	=	1 Pollam	=	0	1	102·38
40 Pollams	=	1 Vis	=	3	1	162·17
8 Vis	=	1 Maund	=	24	10	424·24
20 Maunds	=	1 Candy	=	500		

The Bengal maund is a little more than 82 lbs. Jewellers and native druggists in weighing use the tolah and fanams, and sometimes the scarlet black-tipped seeds, called *Retti*, of the *Abrus precatorius*. The ordinary measures are

			Contents in Cubic inches.
1 Ollock	=		$12\frac{1}{2}$
8 Ollocks	=	1 measure	= 100
8 Measures	=	1 marcal	= 800
			Cubic feet.
400 Marcals	=	1 Garce	= 185·2

France.—In France the scales of weights, capacity and length form as a whole what is called the *Metric system*. The basis of it is the *Metre*, which measures one ten-millionth part of the quarter of the terrestrial meridian, and is equal to 39·3708 English inches. The French scale is also commonly called the decimal system, as all the subdivisions are decimals, rendering troublesome calculations for reduction unnecessary. The metric scales are now almost exclusively used by chemists in recording results of analysis, and being at once so convenient and simple it is to be hoped, that they will soon be adopted in the pharmacopœia, and for general use in all branches of trade.

The French units of measure and value with their English equivalents are as follows :—

Mètre,	unit of	length	= 1 yd. ·0 ft. 3·3708 inch.	English.
Are	,,	surface	= 119·6033 sq. yds.	,,
Stère	,,	solidity	= 1 cu. yd. 8·31658 cu. ft.	,,
Litre	,,	capacity	= 1·76077 pts.	,,
Gramme	,,	weight	= 15·432 grs.	,,
Franc	,,	money	= $9\frac{3}{5}$ pence	,,

The Multiples of measure in the metric system are :—

Déca	= 10	as	Décamètre.
Hecto	= 100	,,	Hectolitre.
Kilo	= 1000	,,	Kilogramme.
Myria	= 10,000	,,	Myriagramme.

The Sub-multiples are :—

Déci	= $\frac{1}{10}$th	as	Decimètre.
Centi	= $\frac{1}{100}$th	,,	Centilitre.
Milli	= $\frac{1}{1000}$th	,,	Milligramme.

Measures of Weight.

			Grs.
1 Milligramme	= $\frac{1}{1000}$ gramme or	0·001 grm.	= ·01543.
1 Centigramme	= $\frac{1}{100}$,, ,,	0·01 ,,	= ·15432.
1 Decigramme	= $\frac{1}{10}$,, ,,	0·1 ,,	= 1·54323.
1 Gramme	= { weight of a cubic centimetre of water at 4° C. }	1·0 grm.	= 15·432348.
1 Decagramme	= 10 grms. or	10·0 grm.	= 154·32348 grs.

1 Hectogramme = 100 grms. or 100·0 grm. = 1543·23487 grs.

1 Kilogramme = 1000 grm. or 1000·0 grm. = 15432·3487 „

MEASURES OF CAPACITY.

1 Millilitre = 1 cub. centim. or the mea. of 1 grm. of water = ·0017607 pts.

1 Centilitre = 10 „ „ 10 grms. „ = ·017607 „

1 Decilitre = 100 „ „ 100 „ „ = ·17607 „

1 Litre = 1000 „ „ 1000 „ „ = 1·76077 „

MEASURES OF LENGTH.

1 Millimetre = $\frac{1}{1000}$ part of 1 metre or 0·001 metre. = ·03937 in.

1 Centimetre = $\frac{1}{100}$ „ „ 0·01 metre. = ·3937 „

1 Decimetre = $\frac{1}{10}$ „ „ 0·1 metre. = 3·937 „

1 Metre = the ten-millionth part of a quarter of the meridian of the earth. = 39·3708 in.

11. *The Thermometer.*—The thermometer is an instrument for measuring temperature,* and its operation depends on the well-known physical law, that bodies expand when heated and contract when cooled. It consists of a closed capillary glass tube with a bulb at one end, and both the bulb and part of the stem are filled with mercury or spirit of wine. In making it great care is taken to exclude air from the vacant space in the upper part of the tube, as

* The state of a body with respect to sensible heat.

the accuracy of the instrument depends much on this being effected. A spirit thermometer must be used when the temperature is below—37·°9 Fhr., as mercury freezes below that point. For all ordinary purposes a mercurial thermometer is the best. When the instrument is heated the column of fluid in the interior gradually expands and rises in the tube, and if cooled, the bulk of the fluid is reduced and the column consequently descends. To mark the temperature some contrivance is necessary, and this is effected by means of a fixed scale of degrees attached to the tube, or engraved on its outer surface. This scale varies in different countries, that of *Fahrenheit* being used in England, Holland and America, the *Centigrade* in France and some other countries, and *Reaumur's* in Germany and Russia.

12. In all these scales there are 2 fixed points which enable us to compare them and to reduce temperatures expressed in one scale to the phraseology of another. These are the freezing point of water, and the temperature at which it boils when the barometric pressure is 29·905 inches with mercury at 32° Fhr. The space on the scale between these points is divided in different ways, in the three kinds of thermometers mentioned. In Fahrenheit's it is divided into 180 equal parts or degrees and as the zero-point is 32 degrees below freezing, the freezing point of water is 32°, and the boiling point 212°. In Reaumur's the zero, 0°, is fixed at the freezing point of water, and the boiling point is 80°. The Centigrade scale is by far the most convenient for scientific purposes. In it the zero is fixed at the freezing point of water, and the space between that and the boiling point is divided into 100 parts. The scale is continued above and below these points, numbers below being indicated by the negative sign.—As it is sometimes necessary to convert temperatures expressed in one into another scale, the following rules are given for the purpose.

To reduce Centigrade to Fahrenheit's. Multiply the Centigrade degrees by 9, divide by 5 and add 32°.

To reduce Fahrenheit's to Centigrade. Subtract 32°, multiply by 5 and divide by 9.

To reduce Reaumur's to Fahrenheit's. Multiply by 9, divide by 4 and add 32°.

13. The thermometer is used in Pharmacy for measuring the temperature in various operations requiring the application of heat, and in ascertaining specific gravity. An ordinary thermometer is not suitable for pharmaceutical purposes, the kind employed being much more accurately graduated, capable of standing a higher temperature without breaking and adapted for immersion in fluids. Such an instrument is commonly sold under the name of a *Chemical Thermometer.*

14. *Specific Gravity.*—In preparing some medicines, and in testing the purity of others it is necessary to ascertain their *specific gravity*, by which we mean the number which indicates the relation of a certain volume of any body, whether solid or fluid, to the weight of the same volume of distilled water at a given temperature. In order to express the specific gravity of solids and fluids we take water at the temperature of 60° Fhr. as the standard, and call its density 1000.

15. In Pharmacy it is rarely necessary to ascertain the sp. grav. of solids, and therefore the method of doing this need not be described here. The instruments commonly used for testing the specific gravity of fluids are the *Hydrometer*, and *Specific Gravity Bottle.* The specific gravity bottle is a little globular glass flask, with a perforated glass stopper accurately fitted, and accompanied by a brass weight or counterpoise of the exact weight of the empty bottle. It is usually made to contain exactly 1000 grains of distilled water, at the temperature of 60° Fhr. In ascertaining the specific gravity of any other fluid the bottle is filled with it, up to a point in the neck a little above that to which the stopper will reach when replaced, so that when this is put in, the air and a small quantity of the fluid escapes through the hole in the stopper. The bottle is then wiped dry, placed in the scale of a balance with the counterpoise in the other, and the contents weighed after cooling, or warming, to 60 Fhr. The specific gravity is then obtained by dividing the weight of the fluid by the weight of the distilled water which the

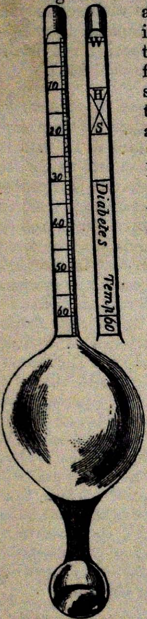
bottle is capable of holding, viz., 1000 grains, the quotient being the specific gravity. Suppose we wish to test a sample of alcohol, and that the bottleful weighs 838 grains, then 838 ÷ 1000 = ·838 which is the specific gravity of the alcohol. If we now fill the bottle with acetic acid, of the regulated strength of the pharmacopœia, it will be found to weigh 1044 grains, and the specific gravity is accordingly stated at 1·044 (1044 ÷ 1000 = 1·044).

16. *Hydrometer.*—The hydrometer used in pharmacy is a glass or brass instrument with an upright stem, and a loaded bulb at the lower end which causes it to float in a perpendicular position, when plunged in any fluid. In Beaume's hydrometer for testing fluids heavier than water the zero, or point to which it sinks in that fluid, is marked at the top and the remainder of the stem is graduated or divided downwards into degrees. The liquid to be tried being put into a narrow glass jar and the instrument placed in it, the height at which the stem is in contact with the surface, as read on the scale, forms an index to the density of the fluid. For testing spirit and fluids lighter than water there are several varieties of hydrometers, but the kinds most commonly used are Sikes's and Gay-Lussac's. The stem of Sikes's has a scale with 10 divisions, each of which is subdivided into 5 parts, and there are 9 weights, made to slip on to the lower stem, marked 10, 20, 30, 40, and so on to 90. When in use it is immersed in the fluid to be tested, and such one of the weights put on the stem, as will bring the lower end of the scale below the surface of the liquid. Then the number on the scale cut by the surface is noted, and this being added to the number on the weight, the resulting sum together with the temperature of the fluid, which must be noted, enables the observer to ascertain the sp. grav. by reference to tables supplied with the hydrometer.

17. Various instruments, constructed on the same principle as the hydrometer, are used in the arts, &c. Thus we have the *Saccharometer* for testing syrups, the *Lactometer* for trying milk, and the *Urinometer* for determining the sp. grav. of urine. The urinometer (Fig. 2) is necessary for every hospital, and is usually put up in a neat case, with a small graduated glass jar for holding and

measuring the urine, a thermometer for ascertaining its temperature, a spirit lamp, test tubes, and capped bottles for holding nitric acid and liquor potassæ which are used as tests. The scale on the stem of the instrument is divided into 60 parts, the zero being the point at which it floats in distilled water. On the reverse side of the stem we find, near the top, the letter W indicating the height at which it would stand in water. Lower down there are the marks H × S, which signify *healthy standard*, and indicate the height at which the instrument will float in healthy urine. By looking at the opposite side of the scale it will be observed, that normal urine ranges in density from 10 to 20 degrees. Below these marks there is the word *Diabetes*, corresponding with the space between 30 and 60 degrees, and indicating that the density of the urine of a diabetic patient will be somewhere between these two points. In using the instrument, pour a sufficiency of the urine to be tested into the little glass jar and float the urinometer in it, observing what number on the scale coincides with the surface of the fluid. Say the indication is 20, than the spec. grav. of the sample of urine is found, by adding this number to 1000 the sp. grav. of water. Thus 1000 + 20 = 1020 the required sp. grav. of the urine. As the urinometer is sometimes imperfectly made, it must be tested before it can be implicitly relied on.

Fig. 2.

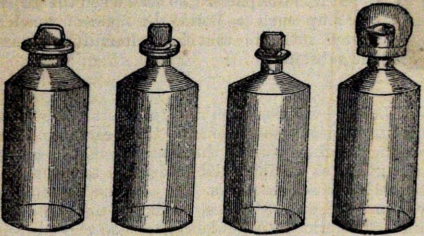


General Apparatus of the Dispensary.

18. *Stock Bottles.*—These should be of clear good

glass, and have accurately fitting ground glass stoppers.

Fig. 3. Fig. 4. Fig. 5. Fig. 6.



Tinctures are kept in bottles of the pattern given in Fig. 5, with a rather stout cylindrical body, short neck and nicely turned lip. Fig. 4 is somewhat similar, but less flat in the shoulder and having a slightly wider mouth. It may be used for holding syrup, glycerine and such like fluids. Both are termed narrow mouthed (N. M.). Salts and powders are most conveniently kept in bottles with wide mouths (W. M.), such as Fig. 3. For dispensing oils, a bottle of the pattern of Fig. 6 will be found very convenient. It is provided with a cap ground on the inner surface, so as to fit accurately a projection on the neck of the bottle. In the absence of a bottle of this kind, one such as Fig. 4 may be used for holding oils. Volatile fluids, such as Chloroform and Ether, are extremely liable to escape even with the most accurately fitting stopper, and a bottle provided with a glass cap, in addition to the ordinary stopper, is frequently used for holding these. The use of coloured glass bottles is recommended for some articles, such as nitrate of silver, hydrocyanic acid, green iodide of mercury, &c., which are liable to be injured by exposure to light. In the absence of such bottles the access of light may be prevented by coating

2

Fig. 7.

the exterior of common ones with black varnish, or pasting over it some thick or dark coloured paper. Poisonous drugs should, to prevent mistakes in dispensing, be kept in fluted bottles (Fig. 7), and non-poisonous articles should never be put into this pattern, so that when the dispenser takes up such a bottle the sense of touch may always intimate that he is handling a dangerous substance.

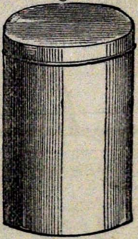
19. *Labels.*—Bottles should have distinct labels, exhibiting the officinal designations of their contents. In the case of acid and oil bottles the letters should be engraved on the glass, as ordinary labels are apt to get soiled or destroyed by these substances. For other articles the names may be painted on the bottles, in black letters on a yellow ground. Silverlock's paper labels are also very convenient and neat. In applying them the labels should be nicely cut from the book in which they are sold, and pasted on the bottles with gum. When quite adherent, they should receive 2 or 3 coats of a moderately thick solution of isinglass in water, laid on with a camel hair brush. On the isinglass becoming dry, apply a coating of any clear spirit varnish, such as copal, and the labels will look well for years and may be washed when dirty. Besides the stock bottles, the dispensary should also be furnished with a supply of moulded phials N. M. and W. M., ranging in capacity from ½ to 8 oz., for sending out medicines to patients. Empty wine and spirit bottles may also be utilised for dispensing.

20. *Corks.*—These are made of the bark of a tree, *(Quercus suber)* the Cork-oak. They vary much in quality, those which are "velvety" and elastic being the best. The *Cork-presser* is a simple lever press for squeezing corks, so as to make their introduction more easy, and to cause them to fit more tightly. A supply of corks of various sizes should be kept in every Dispensary, and, in the absence of a *presser*, their introduction will be facilitated by soaking them in water and beating them with a piece of wood prior to introduction.

21. *Jars, &c.*—Extracts and ointments are kept in stoneware jars of various sizes, and jellypots or gallipots. The larger jars are of two kinds, canopy topped (Fig. 8) and flat topped (Fig. 9.).

Fig. 8.

Fig. 9.



The former may be used for holding ointments, and the latter for extracts. They should be well glazed, and labelled as in the case of bottles. Jellypots Figs. 10 and 11, and gallipots Fig. 12 are usually sold in nests, and have a groove round the neck to hold the ligature for securing a tie-over cover of leather or paper. The smaller sizes of both are chiefly used for sending out medicines, such as ointments and confections, to patients. They are very ill adapted for keeping stock supplies, as from the access of air ointments soon get rancid and extracts become dry and inert. When it is necessary to use jellypots for such purposes, the mouth should first be closed with a piece of tin foil or waxed paper, and then covered with leather or bladder.

Fig. 10. Fig. 11. Fig 12.

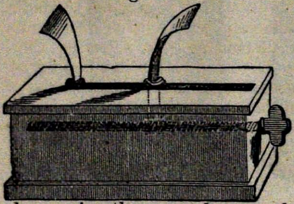
22. *Pill-boxes* are made of paste board covered with fancy paper, and sold in nests or single by the gross.

Salve or Ointment Boxes.—These are made of earthenware or chip, but the latter are very ill-suited for dispensing ointments in India, as, owing to the high temperature, they are apt to leak and get dirty outside.

Twine-box.—This useful appendage is hollow and urn-shaped, with a hole in the top through which the string runs from a coil inside.

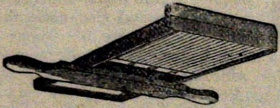
23. *Powder Folder.*—This consists of a brass box and 2 upright blades, which can be separated and fixed at any required distance by an adjusting screw. The use of the instrument is two-fold, viz. to facilitate folding, and to enable the dispenser to make all the papers containing a set of powders of uniform length. In using it the two end folds are obtained by simply pressing the paper down on the blades, with the thumb of each hand.

Fig. 13.



24. *Pill Machine.*—Fig. 14. This indispensable and well known implement is used for the division of masses into pills. It consists of a grooved plate of brass fixed on a small wooden frame, which rests on a table, and of a cutter or roller with a corresponding narrow grooved plate. The latter is furnished with 2 handles, by which the operator can grasp and move it over the lower part of the machine, and with little brass rollers and guides which cause it to slide easily and with accuracy. In selecting one, care should be taken that it is strong in construction throughout, and that the grooves in the lower plate and cutter are of the same size, so that when the latter is applied it may divide the mass with precision.

Fig. 14.



Pill Tiles.—These are small square glazed tiles, either plain or graduated so as to facilitate the division of a cylinder of pill-mass into a given number of parts. In the absence of a pill machine, the tile may be used for mixing, rolling and dividing pill-masses with the aid of a spatula. It is also frequently used, and well suited, for mixing ointments.

25. *Spatula.*—Fig. 15. The *spatula, or bolus-knife*, consists of a blunt, flexible, thin steel blade and a black wooden handle.

Fig. 15.

Two or three such implements, with blades of different length, are required for dispensing. In selecting them care should be taken to have one rather flexible, for removing adherent pill-masses or powders from the sides of a mortar, &c. The spatula is employed for lifting and dividing powders and folding the paper in which they are put up, for scraping the mortar during the process of pulverisation, mixing ointments, rolling and dividing small portions of pill-mass, and numerous other purposes. Porcelain, glass, bone and wooden spatulas are also used, for manipulating articles which would corrode the blade of the steel one.

Plaster Spatula.—This implement is sometimes used for spreading plasters on leather or cloth. It consists of a thick iron blade from 2 to 4 inches long, connected with a wooden handle by a bent iron rod. Before being used the blade is heated, to a degree sufficient to melt and spread the plaster by pressure without burning it.

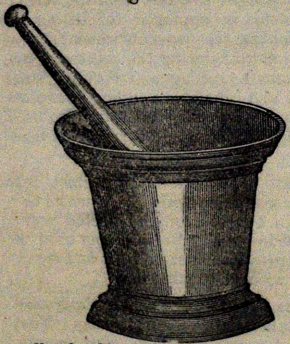
26. *Mortars.*—Mortars, Fig. 16, are perhaps more frequently used than any other article in dispensing. They are made of *wedge-wood ware, porcelain, glass, marble, brass* or *iron*, with pestles of the same materials. The wedgewood, porcelain and glass mortars are cup-shaped, and should have a well turned lip for pouring out fluids, and a broad strong perfectly flat base to keep them steady when in use. The bulb of the pestle should be of a shape adapted for triturating substances in the mortar, and care should be taken that the upper wooden part is securely cemented in its socket.

The pestle of the glass mortar is made of glass throughout. The wedgewood mortar is used for reducing substances not very difficult to powder, to mix pill masses, &c. The porcelain, not being so easily stained as the wedgewood, mortar is useful for mixing ointments and other fatty preparations. The glass mortar is very convenient for dissolving salts, mixing corrosive chemicals, making ointments and preparing small quantities of pill masses containing active ingredients. Owing to its smooth surface, it is not so well adapted for preparing powders, and, as it is easily broken, it should never be used for reducing hard substances.

Fig. 16.

The marble mortar is generally of considerable size, and is used for mixing large quantities of powders, reducing substances not very hard, making grey powder, preparing confections, &c. Acids and other corrosive substances should never be introduced into the marble mortar. Iron and brass mortars, Fig. 17, are used for reducing to powder roots, barks, and other substances of hard texture. Drugs containing tannin, such as galls, should never be powdered in the iron mortar.

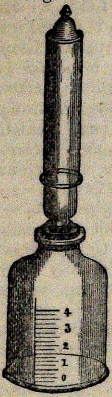
Fig. 17.



27. The *Root-Cutter* consists of a jointed lever, with a knife edge on its lower surface, fitted firmly on a flat strong base of wood. It is used, as its name implies, for cutting roots into small pieces, so as to fit them for the preparation of infusions or decoctions, or to render them more easy of reduction in the brass or iron mortar.

28. The *Percolator or Displacement Apparatus*, Fig. 18, is used for the extraction of the active principles of vegetable substances by means of spirit or water, so as to form a tincture or infusion. The process of percolation, as compared with that of maceration, has the advantages of being much more speedy and effective. The apparatus consists of a glass tube or cylinder, so contracted at its lower end as to permit of its being fitted into the mouth of a bottle shaped vessel, the receiver. The cylinder or percolator is made in various shapes. It is very convenient to have the receiver graduated as in Fig. 18, so that the exact quantity of fluid which has passed through the drug in the percolator, may be ascertained by a glance at the scale of figures. In the absence of more suitable apparatus, a lamp chimney or inverted bottle with the bottom cut off and inserted in any wide-mouthed bottle, forms a fairly efficient displacement apparatus.

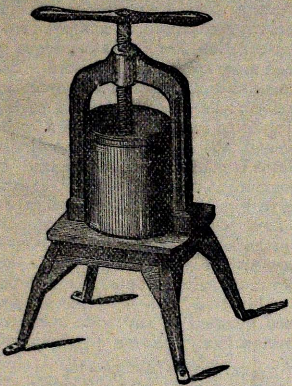
Fig. 18.



29. When about to use it, tie a piece of cotton cloth over the lower end of the percolator, or stuff it loosely with cotton wool, so as to prevent any particles of the solid contents from passing through. Then reduce the drug to a uniform powder, not too fine, and add enough of the fluid to render it damp, without causing it to cohere in lumps or converting it into a pulpy mass. Next pack it loosely in the percolator, place this in the receiver, and pour the menstruum on the upper surface of the powder, until the required quantity has passed down into the receiver. A further account of the process will be given in Chapter III, in describing the various pharmaceutical operations.

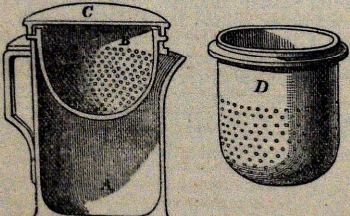
30. The *Tincture Press* is a compact screw press for squeezing out and recovering the last portions of fluid, which remain in the marc when preparing tinctures by maceration. In using it the marc is put into a strong canvas bag, which prevents any portion of it from passing out with the fluid.

Fig. 19.



31. *Infusion Pot.*—The vessel commonly used for this purpose is a moderately sized stoneware jug, with a cover. Tin saucepans are also employed, but are not well adapted for the purpose, as, when the tinning gets worn, they act injuriously on infusions containing an astringent principle. Squire's infusion pot, Fig. 20, is a very convenient kind of vessel for preparing infusions, as when it is employed there is no necessity for using a cloth to strain the residuum. It is made of stoneware, and consists of a jug *A* with a convenient spout, a nicely fitting cover *C*, and two cup-shaped perforated receptacles *B* & *D*, of different depths. When in use the cover is removed, and one of

20.



the basins put in position in the jug. The vegetable substance to be acted upon is then placed in the cup, and the water being poured on it passes through. The lid of the jug is thereafter replaced, and the process of digestion allowed to go on for the requisite period. The larger or smaller cup is used according to the quantity of water employed, so as to secure immersion of the drug in the upper part of the fluid during digestion.

31. *Glass Funnels.*—These are of different sizes, and plain or fluted. They are chiefly used for filtering, and for ordinary pharmaceutical purposes the fluted funnel is the better form.

32. *Filters.*—The usual filtering medium used with the funnel is a peculiar kind of paper, made without size and very porous. The best filtering paper is white, not too thick or too easily torn, and destitute of any soluble matter. Several methods may be adopted in folding the paper for a filter, but the simplest and most convenient is that represented in Figs. 21 and 22. To make this first crease the paper at the dotted line *b. c.* the corner *d.* being placed over *a.* Then place the point *c.* over *b.* so as to make the crease *a. e.* and cut off the corners *a.* and *b.* as indicated by the curved dotted line, and when the filter is opened, it will have the form indicated in Fig. 22. In filtering volatile fluids, to prevent loss by evaporation, the tube of the funnel should be fixed in the mouth of a bottle by means of a perforated cork, and the top of the funnel closed by placing on it a plate of glass. To permit the passage of air from the bottle

Fig. 21.

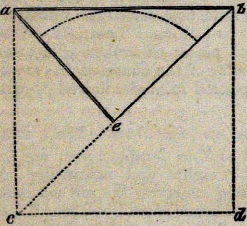
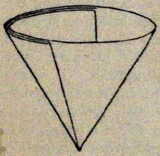


Fig. 22.



to the upper part of the funnel place a piece of glass tube, twisted at its lower end so as to prevent its descending into the neck, between the funnel and the filter. Woollen or cotton cloth is sometimes employed as a filter, the former being used for straining ointments and oils, and the latter infusions, decoctions, &c. Such a filter is usually made in the shape of a conical bag, and should have strings at the upper wide end, to permit of its being tied to a hoop of wire or cane to keep the bag distended. When in use, it should he suspended in a convenient position by bits of twine fastened to the hoop, and have a vessel placed underneath to receive the fluid as it flows out of the filter. After use, the cloth must be removed from the hoop and thoroughly washed. Charcoal is also sometimes used as a filtering medium, as it has the property of decolourising many fluids, and even of removing offensive odours. Purified animal charcoal is the kind best suited for filtration, and the mode of using it is as follows. The neck of the funnel is partially closed with pieces of broken glass, and over this is placed a thick layer of the charcoal in coarse powder. The fluid is then poured in, and allowed to pass slowly through the charcoal.

33. *Dispensing Room and its Furniture.*—The room should be well lighted, and contain 2 tables, viz., one for dispensing with scales and weights and measuring out fluids, and the other for using mortars, the pill machine, spreading plasters, &c. The former should be about 6 feet long, 4 feet wide, and from 3 ft. to 3 ft. 4 in. in height. The top should be teak or other hard wood 1 inch thick, and it will be found convenient to have 2 shallow drawers below it. One drawer should be provided with divisions for keeping cut papers of various sizes for making labels, putting up powders, wrapping bottles and pill boxes, &c., and the other be conveniently divided for keeping supplies of corks, pill boxes, phials, scissors, &c. The second table may be of somewhat smaller size, but should have a thicker top, and be altogether of stronger construction. It should also be furnished with 2 drawers for putting away mortars, pill machine, towel, &c., and below the drawers there should be a shelf with folding doors to form a cup-board, for keeping infusion pots, sauce pans and other articles in daily use. On the first table, the scales and weights, glass

measures, funnel, and a spatula should be kept carefully ranged and clean, so as to be always ready for use. There should also be placed on it pen and ink, and a copy of the Pharmacopœia and of some standard work on Materia Medica. The stock of medicines should be arranged on shelves, or kept in cup-boards close to the dispensing table, and the greatest care should be taken to keep the bottles, jars, &c., free from dust. Should any label become indistinct from age or otherwise, it must at once be renewed. For keeping a supply of water in a large establishment, a small covered water-tight tank will be found convenient. It should be placed in a cool clean situation, be fitted with a stop-cock that will enter the mouth of a common bottle, and be daily filled with good filtered water. In smaller dispensaries a common *country-made*, or patent English, filter should be kept for the supply of pure water. A properly constructed sink and drain, for carrying off the washings of bottles, &c., will also be found convenient, but where this arrangement cannot be had a jar should be kept for slops, and its contents removed to a distance once or oftener daily.

CHAPTER II.

Sources, Selection, Adulteration of Medicines, &c.

34. *Sources and Natural State of Medicines.*—Drugs, as already stated, are derived from the mineral, vegetable and animal kingdoms, and as nearly all of them are in their natural state unfit for medicinal purposes, they have, before being used, to be submitted to various chemical and pharmaceutical processes. Thus hard substances in bulk have to be pulverised, sulphur to be sublimed, spirituous liquors, &c. to be distilled, roots and barks to be dried, and so on. A large portion of the articles of the Pharmacopœia is derived from the vegetable kingdom, and it is desirable that the student should know, not only the names of the plants which yield the medicines, but also the parts of the world in which they grow. Europe, Asia, Africa and America all contribute to the list of English *Materia Medica*, and the following table exhibits the geographical sources of the chief vegetable and animal substances used as drugs.

GEOGRAPHICAL SOURCES OF OFFICINAL ARTICLES, DERIVED FROM THE VEGETABLE AND ANIMAL KINGDOMS.

EUROPE.

NORTHERN EUROPE.

Cetraria, Ichthyocolla, Oleum morrhuæ, Oleum terebinthinæ, Pix, Resina, Santonica.

Great Britain.

Aconitum, Adeps, Anethum, Anisum, Anthemis, Armoracia, Belladonna, Cera flava, Conium, Coriandrum, Digitalis, Dulcamara, Filix-mas, Glycyrrhiza, Hordeum, Hyoscyamus, Juniperus, Lactuca, Lavandula, Larix, Linum, Lupulus, Mel, Mentha, Mezereum, Morus, Papaver, Quercus, Rhamnus, Rosa, Rosmarinus, Ruta, Sabina, Sambucus, Scoparius, Sevum, Sinapis, Stramonium, Taraxacum, Triticum, Ulmus, Uva ursi, Valeriana.

CENTRAL EUROPE.

Arnica, Cantharis, Ergota, Gentiana, Hirudo, Pix burgundica.

SOUTHERN EUROPE.

Amygdala, Aurantium, Cantharis, Colocynthis, Crocus, Ecbalium, Fœniculum, Granatum, Laurocerasus, Limon, Manna, Oliva, Prunum, Scilla, Spongia, Uvæ.

ASIA.

CENTRAL ASIA.

Ammoniacum, Assafœtida, Galbanum, Moschus, Rheum, Sumbul.

WESTERN ASIA.

Acacia, Aloe, Ficus, Mastiche, Myrrha, Opium, Pyrethrum, Scammonia, Styrax, Tragacantha.

SOUTHERN ASIA.

India.

Acacia, *Adeps*, Areca, *Aurantium*, Bela, Cannabis indica, Capsicum, Cardamomum, Cassiæ pulpa, Catechu, Chirata

Chinchona pallida, *Chinchona flava*, *Chinchona rubra*, Cinnamomum, Croton, *Digitalis* Gossypium, Granatum, Hemidesmus, *Ipecacuanha*, *Jalapa*, Kamala, Kino, *Limon*, *Mentha piperita* Mylabris cichorii, Nux vomica, Opium, Piper, Pterocarpi lignum, Ricinus, Saccharum, *Senna*, Sevum, *Tabacum*, Tamarindus, *Taraxacum*, Zingiber.

China and East India Islands.

Benzoin, Cajuputi oleum, Cambogia, Camphora, Catechu, Caryophyllum, Cubeba, Elemi, Myristica, Piper.

AFRICA.

Aloe, Amygdala, Buchu, Calumba, Capsicum, Cusso, Physostigma, Senna.

AMERICA.

North America.

Castoreum, Lobelia, Podophyllum, Sassafras, Senega, Serpentaria, Terebinthina, Thus, Veratrum viride.

Central America.

Balsamum peruvianum, Coccus, Hæmatoxylum, Jalapa, Sabadilla, Tabacum.

South America.

Balsamum tolutanum, Cetaceum, Chinchonæ, Copaiba, Cusparia, Ipecacuanha, Krameria, Matica, Nectandra, Pareira, Theobroma.

West Indies.

Aloe, Canella, Cascarilla, Guaiacum, Pimenta, Quassia, Tamarindus, Zingiber.

Further information as to the geographical sources of drugs will be found in Chapter IV, Pharmaceutical Materia Medica.

Selection and Collection of Medicines.

35. Before attempting the selection of drugs it is necessary to have a thorough acquaintance with their physical characteristics, such as form, weight, colour, smell and taste. These are specified in the pharmacopœia, and if a

sample of any medicine do not possess all the characters mentioned there, it should be rejected. There are also various chemical tests for ascertaining the quality and purity of drugs, which must be carefully attended to by the dispensing and wholesale druggist in the purchase of supplies.

Medicinal plants should be gathered when they are in full vigour.

36. *Roots* in general should be dug up in autumn, or at the time at which the leaves fade.

37. *Biennial Roots* should be collected at the close of their first year of growth; *Ex.* Colchicum. On being taken up roots should be carefully dried in the shade, or with gentle heat if necessary. Some roots are dried entire, and others, such as Calumba and Squill, are cut into slices so as to facilitate the drying process. Roots that are to be used fresh may be kept so for a long time, by being stored in dry sand.

38. *Barks* should be gathered at the time when they can be most readily separated from the tree, that is early in spring in temperate, and about the beginning of the rainy season in tropical climates. If, however, the tree be then in flower, the bark should be removed before the appearance of the flowers.

39. *Woods.*—If the trees lose their leaves annually, the wood will be found to be richest in medicinal properties about or shortly after the fall of the leaves. The wood of evergreens is in best condition for medicinal purposes in winter in temperate, and about the end of the hot season in tropical climates. As a rule the heart wood is richer in active principles than the pale outer sap-wood; *Ex.* Guaiacum.

40. *Leaves* are fittest for medicinal use when the flowers are beginning to open. When collected, they should be dried at a temperature of from 130° to 140° in a dark room, when they will be found to preserve their green colour and properties better, than if dried slowly and exposed to light.

41. *Flowers* are to be gathered when in partial or full bloom, except the *Rosa gallica* which is gathered in the bud. Long exposure to the sun exhausts the odorifeous prin-

ciples of flowers, and they should therefore be collected in the morning unless wet with rain or dew, in which case they must be left until dry. Sometimes the flowering top containing a number of flowers, as in the Rosemary, is to be gathered, and at other times the flowers are to be collected singly, as in the Cabbage Rose. Flowers must be dried quickly in the shade, and some require the exclusion of light during the process.

42. *Fruits* if they are to be used immediately should be left until quite ripe, but if to be preserved, they must be pulled when slightly green. In some cases, in which the fruits are valuable on account of acidulous or astringent properties, it will be found that these disappear during the ripening process ; *Ex.* Bael.

Seeds should be collected when the fruit is quite ripe ; *Ex.* Stramonii semina.

The following lists include the chief roots, barks, &c., of the pharmacopœia.

43. *Officinal Roots and Under-Ground Stems.*

TRUE ROOTS.

Aconitum.	Sarsa.
Calumba.	Granati radix.
Pareira.	Valeriana.
Armoracia.	Arnica.
Senega.	Hemidesmus.
Krameria.	Belladonna.
Glycyrrhiza.	Jalapa.
Ipecacuanha.	Rheum.
Taraxacum.	Sassafras.
Gentiana.	Serpentaria.
Scammonia.	

UNDER GROUND STEMS OR RHIZOMES.

Curcuma.	Filix mas.
Zingiber.	Podophyllum.

BULB.	CORM.
Scilla.	Colchicum.

44. *Officinal Barks.*

Cascarilla.
Chinchona flava.
,, rubra.
,, pallida.
Cinnamomum.
Cusparia.
Larix.
Nectandra.
Mezereum.
Ulmus.
Quercus.
Canella.

45. *Officinal Woods.*

Calumba.
Dulcamara.
Hæmatoxylum.
Pterocarpi lignum.
Guaiacum.
Quassia.

46. *Officinal Leaves Tops, &c.*

Aconitum.
Scoparius.
Sabina.
Cannabis.
Chirata.
Hyoscyamus.
Conium.
Tabacum.
Melaleuca (*Cajuput.*)
Aloe.
Matica.
Buchu.
Senna.
Laurocerasus.
Uva ursi.
Belladonna.
Stramonium.
Digitalis.
Ruta.
Uncaria (*Catechu.*)
Mentha piperita.
,, viridis.
Cetraria.

47. *Officinal Flowers, &c.*

Rhœas.
Crocus(*Stigma & style.*)
Rosa centifolia.
,, gallica.
Caryophyllum.
(*flower buds.*)
Cusso.
Sambucus.
Santonica.
Anthemis.
Lupulus.
Aurantium.
Cannabis indica.
Rosmarinus.
Lavandula.
Aurantium.

48. *Officinal Fruits.*

Colocynthis.
Pimenta.
Rosa canina.
Cassia.
Limon.
Aurantium.
Papaver.
Ecbalium. (*Elaterium.*)

Tamarindus.
Prunum.
Anisum.
Fœniculum.
Coriandrum.
Conium.
Carum.
Anethum.
Juniperus.
Bela.
Piper.
Cubeba.
Capsicum.
Ficus.
Morus.
Sabadilla.
Rhamnus.
Uvæ.

49. *Officinal Seeds.*

Linum.
Sinapis.
Amygdala.
Stramonium.
Cardamomum.
Ergota.
Physostigma.
Nux vomica.
Myristica.
Croton.
Ricinus.
Colchicum.
Hordeum.

Preservation of Medicines.

50. Medicines have to be carefully preserved, especially in a tropical climate, to prevent their being injured by the air, changes of temperature, dust or insects. They must also be carefully arranged and labelled, so as to obviate the slightest risk of mistakes in dispensing. Some drugs such as Nitrate of silver, Green iodide of mercury, Santonin, Elaterium, Digitalis and Hydrocyanic acid, must be kept in bottles of dark coloured glass or bottles covered with paper, so as to exclude the light, as exposure injures them. All the alkaloids, such as Quinine, Strychnia, &c. should also be kept in the dark, as the action of light gradually impairs their quality less or more. Contact with the air is especially injurious to some articles. Thus Acetate of potash and Chloride of zinc deliquesce, while Iodide of iron and Carbonate of ammonia undergo destructive chemical changes, and must therefore be kept in air tight bottles. Chloroform and Ether are so very volatile in India, that no ordinary cork or stopper will prevent evaporation. The stopper should therefore be luted to the lip of the bottle with wax or glue, and secured with a cap of bladder or leather. In the case of Ether, if the bottle be closed with a cork it should be examined at short intervals, as this fluid causes cork to shrivel. Some articles

such as Liquorice, Nutmegs and Ginger are particularly liable to the attacks of insects, and should be procured as fresh as possible. Rhubarb and Calumba also suffer from insects, and must therefore be examined frequently, cleared of these enemies and exposed for a short time to the sun. Ergot of rye is attacked by a small acarus, to prevent which a piece of camphor may be kept in the bottle. The blistering beetle, *Mylabris cichorii*, has also a destructive insect enemy, and must be protected like ergot with camphor.

51. *Poisons* should be kept separate from all other medicines in a lock fast *almirah* (cupboard), which should never be opened except when a drug is required from it, and, when this has been dispensed, the bottle should immediately be restored to its place and the door relocked. Another useful precaution is to keep all poisonous drugs in the fluted bottles, described in para. 18. When poisons are kept in ordinary bottles the labels should be of a blue colour. The following is a list of the chief poisonous drugs in use in hospitals, which should be kept separate from all other medicines in a locked cupboard :—

Acetum mylabr. cichor.	Liquor arsenicalis.
Acid. hydrocyanic. dilut.	„ atropiæ.
Aconitia.	„ hydrargyri perchloridi.
Amyl nitris.	„ morphiæ acetatis.
Antimonium tartaratum.	„ „ hydrochloratis.
Atropia.	„ strychniæ.
Chloroformum.	Oleum crotonis.
Digitalis pulvis.	Opium.
Elaterium.	Pulvis cretæ aromat. cum opio.
Extractum aconiti.	„ ipecac. co.
„ belladonnæ.	„ kino co.
„ cannabis indicæ.	Strychnia.
„ nucis vomicæ.	Tinctura aconiti.
„ opii.	„ belladonæ.
„ „ liquidum.	„ cannabis indicæ.
Hydrargyri iodidum rubrum.	„ cantharidis.
„ iodidum viride.	„ digitalis.
„ oxidum rubrum.	„ lobeliæ.
„ perchloridum.	„ opii.
Hydrargyrum ammoniatum.	Vinum opii.
Linimentum opii.	Zinci chloridum.

ADULTERATION OF INDIGENOUS DRUGS.

52. The European medicines issued from the Government Stores in India are usually of the best quality procurable in the English market, but when supplies are got from other sources, they should be carefully tested according to the rules laid down in the pharmacopœia. Indigenous drugs are very liable to be contaminated or spurious, the native dealers and contractors being most ingenious adepts in this species of trickery, and all supplies received from them should be examined with the greatest care. The following is a list of the chief bazaar medicines, and of the adulterations to which they are liable in India.

Aloes.—Is often mixed with dirt and gravel, to make up the dealer's loss from dryage in his stock.

Assafœtida.—Often mixed with dirt, gravel and bits of rag; should be broken and a fresh fracture examined.

Benzoin.—Often old and deteriorated.

Cajuput Oil.—A spurious article is very common. The genuine article has a pale green colour.

Camphor.—The bazaar dealers moisten camphor to increase its weight, and fresh cakes often contain about $\frac{1}{4}$th their weight of this fluid.

Cassia pulp.—This usually contains a large quantity of fragments of the pod.

Castor Oil.—At times contains albumen, which may be detected by applying heat so as to coagulate the impurity.

Catechu.—When this article is asked for dealers usually bring the dark kind, as it is cheaper than the pale.

Cinnamon.—Is difficult to get of good quality, and Cassia is often substituted for the genuine bark, or mixed with it.

Cloves.—Very inferior samples are sold in the bazaars, and such as have been good originally may have deteriorated from age, or have been injured by the partial extraction of their volatile oil. Good cloves are plump and of fair size, and should leave an oily stain when pressed between the thumb nails.

Coriander.—Very subject to attacks of insects, and should be carefully examined.

Country Liquorice.—Is often full of insects, and should be carefully examined when taken into stock and exposed occasionally to the sun.

Country Sarsaparilla (Hemidesmus indicus).—Frequently adulterated with other roots. The absence of the general characteristics and smell and taste of the genuine article, renders this fraud easy of detection.

Cubebs.—An old and inferior article frequently offered.

Gingely oil (Sesamum indicum).—Often dark in colour from having been mixed with an inferior oil, or from defective preparation.

Gum acacia.—Dark and dirty tears are often mixed with the under portions of a supply, and sometimes a kind of gum is tendered which is insoluble, from its containing *bassorin.*

Kamala.—Very rarely pure. Generally mixed with red sand. This may be detected by the microscope, or by burning a small quantity. Under the latter test the Kamala is consumed, and the sand left as a residue.

Nutmegs.—Are very subject to the attacks of a small insect, and should be carefully examined, as if an infested nut be taken into stock the whole will speedily be destroyed.

Opium.—Is often mixed with dirt, stones or oil. Such opium is apt to turn mouldy, is very heavy, and has a sour smell instead of the peculiar pleasant odour of the genuine article.

Soap.—The country article loses nearly 50 per cent. of its weight in drying, and allowance should be made for this loss in receiving a supply.

Squills.—Sometimes dark in colour, owing to their not having been properly dried.

Sugar.—Often mixed with rasped vegetable substances or sand, and moistened to increase the weight.

Tamarind pulp.—Sometimes mixed with fragments of the pods and pounded seeds.

Treacle.—A solution of *jaugery* (the crude inspissated juice of the Sugar cane) is often substituted for treacle.

Wax.—The lower part of the cake is usually very impure, and the remelting, until extraneous matter is got rid of, should be insisted on.

ADULTERATION OF ENGLISH DRUGS.

53. The following are some of the adulterations met with in drugs in the English market.

Angustura.—The bark of the Strychnos nux vomica is sometimes substituted for cusparia, but is easily detected by its being non-aromatic, and by the inner bark being stained red by nitric acid.

Canella alba.—Winter's bark is sometimes substituted, but may be detected by its differing in colour, both externally and internally, from the genuine article as described in the pharmacopœia.

Citric acid.—Sometimes contains tartaric acid, which may be detected by a solution of a potash salt producing a white precipitate.

Chloroform.—May be adulterated with alcohol or ether. The presence of either of these reduces the specific gravity, and renders the fluid readily inflammable. Chlorine and Hydrochloric acid are also sometimes present and may be detected by their smell.

Copaiba.—May be adulterated with Wood oil or Turpentine. In the former case the article may be of a brownish instead of a light yellow colour. Turpentine may be detected by the application of heat, which causes the peculiar odour of turpentine to be given off. Sometimes Wood oil is substituted for copaiba. This may be detected by heating the fluid in a corked vial to 270°, as under this test Wood oil becomes turbid and gelatinons, whereas copaiva is unaffected by heat.

Guaiacum.—Sometimes adulterated with other resins, which may be detected by ignition, pure guaiacum yielding when burning an aromatic odour, whereas that of the spurious article will be disagreeable.

Ipecacuanha.—Other roots such as that of the *Psychotria* are substituted for that of the genuine article, but are easily detected, as no other root has the decided annulated character of Ipecacuan.

Jalap.—Is liable to adulteration with various other roots, but these do not possess the round corrugated appearance of the true Jalap tuber, or its dark resinous fracture and dense texture.

Myrrha.—Another gum resin is sometimes mixed with myrrh, but may be detected by its differing in colour from the genuine article, and by the absence of the agreeable fragrance of the myrrh.

Potassii bromidum.—May contain iodide of potassium. The pharmacopœia test detects this.

Quiniæ sulphas.—Adulterated with the cheaper alkaloids cinchonine and quinidine. The pharmacopœia tests detect these.

Rhubarb.—A spurious article, the product of an European Rheum, is sometimes substituted. It may be detected by its being lighter in weight and colour, by the absence of the grittiness of good rhubarb when chewed, and by its not having the strong smell of real rhubarb.

Senna.—Alexandrian senna may be adulterated with the leaves of *Tephrosia apollinea*, and *Solenostemma argel.* Both these are larger and thicker than the leaf of the senna; moreover that of the senna is unequal sided and of a green colour, whereas the leaves of the fictitious articles are equal sided and of a very pale green hue.

Scammonium.—Very liable to adulteration being mixed with sand, earth, gum, starch and various other substances. The genuine article is always in irregular shaped lumps, while the spurious occurs in more or less regular cakes. Scammony is also easily broken, its fracture resinous black and its odour cheesy, whereas the adulterated article is difficult to break, has a grey fracture and is devoid of the characteristic smell. Again true scammony is not affected by hydrochloric acid, whereas the bad effervesces.

Spiritus ætheris nitrosi.—At times contains nitrous acid, the presence of which is indicated by the brownish colour of the fluid.

* Further information on this subject will be found in the pharmacopœia.

ACTIVE PRINCIPLES OF VEGETABLE DRUGS.

54. The more important elements of plants are carbon, hydrogen, nitrogen, oxygen, phosporus and sulphur, which form combinations varying both as to the number of these elements and the number of atoms of the respective elements which they contain. Besides these, plants also contain potassium, calcium, magnesium and iron; and generally sodium, manganese, silicon and chlorine. The active or proximate principles of vegetable drugs consist chiefly of carbon, hydrogen, oxygen and nitrogen, and many of them such as the alkaloids, vegetable acids and essential oils form convenient and active remedies. At present preparations of this class are in great demand, and their number is being gradually increased by the skill of the chemist. In fact at the present day the tendency is to substitute as far as possible the active principle for the crude preparation of a drug, inasmuch as the former is generally more elegant, more easily administered and more certain in its action. Properly speaking the active principles of plants include alkaloids, vegetable acids, essential oils, gums, resins, fixed oils, fats, sugar, starch, albuminoid constituents, &c., but only the more important of these need be noticed here.

Alkaloids.—These substances are so named from their resemblance, as regards their chemical properties, to the mineral alkalies. Thus they are generally solid and crystalline, capable of forming salts with acids, and will usually restore the blue colour of acidified litmus paper. The majority of our more active vegetable drugs, especially those belonging to the category of poisons, contain an alkaloid, which is usually combined with some organic acid. Thus quinia and the other cinchona alkaloids exist in the barks as *kinates*, that it is in combination with kinic acid. The alkaloids are not readily soluble in water, but dissolve quickly in most of the dilute acids as well in ether and chloroform. Spirit acts on them more readily than water. The chief alkaloids are,

ACONITIA, Aconitina or
Aconitine ($C_{30}\ H_{47}\ NO_7$).
(Got from various species of *Aconitum*).

ATROPIA or Atropine ($C_{17}\ H_{23}\ NO_3$).

(Got from *Atropa belladonna*).

DATURIA the alkaloid existing in the Indian *Datura alba* and officinal *Datura stramonium* seems to be identical with atropine, hence the value of extract of Datura for dilating the pupil.

BEBERIA or Beberine (C_{18} H_{21} NO_3).

(Got from *Nectandra Rodiœi*).

CINCHONIA or Cinchonine (C_{20} H_{24} N_2O) and
CINCHONIDIA or Cinchonidine (do.)

(Both these are products of *Cinchona* bark).

MORPHIA or Morphine (C_{17} H_{19} NO_3, H_2O).

(Got from opium a product of the capsules of *Papaver somniferum*).

QUINIA or Quinine (C_{20} H_{24} N_2 O_2) and
QUINIDIA or Quinidine (do.)

(Both are got from *Chinchona* bark).

STRYCHNIA or Strychine (C_{21} H_{22} N_2 O_2).

(Got from the fruit of *Strychnos Nux-vomica*).

VERATRIA or Veratrine (C_{32} H_{52} N_2O_8).

(Got from *Sabadilla* the fruit of *Asagrœa officinalis*).

It will thus be seen that the whole of the medicinal alkaloids consist of different combinations of carbon, hydrogen, oxygen and nitrogen. In cases of poisoning by alkaloids the effects are so rapid that the promptest action is necessary in treating them. As a rule chemical or physiological antidotes are not much to be depended on, but astringent solutions and tannic acid are useful as they precipitate alkaloids in solution and thus give time to try to get rid of them by emetics.

Acids.—The acids of plants are usually found in combination with bases such as the alkaloids, or potash, lime or soda. Most of the officinal organic acids are solids, soluble in water and in alcohol. They also combine with bases to form salts, such as citrate of potash. All of them with the single exception of hydrocyanic acid contain oxygen.

The following are the officinal acids of this class:—

ACIDUM BENZOICUM ($HC_7 H_5 O_2$).

(Got by sublimation from the resin *Benzoin* a product of the tree *Styrax Benzoin*).

ACIDUM CITRICUM ($H_3 C_6 H_5 O_7 H_2O$).

(Got from *Citrus limetta*, &c.).

ACIDUM GALLICUM ($H_3 C_7 H_3 O_5. H_2O$).

(Got from *Gall-nuts* and various other astringent substances.)

ACIDUM HYDROCYANICUM DILUTUM (HCN dissolved in water).

(Exists in the distilled oils and waters of the Cherry-Laurel and Bitter almond. Made from *Ferrocyanide of potassium*.)

ACIDUM TANNICUM ($C_{27} H_{22} O_{17}$).

(Got from gall-nuts).

Fixed oils and fats.—These substances consist of the elements carbon, hydrogen and oxygen, and are got both from the vegetable and animal kingdoms. They vary greatly in their action some being cathartic, some nutrient, and some emollient or demulcent. Both fats and fixed oil communicate a greasy stain to paper which is not removed by heat. The vegetable oils are got by expression from seeds or fruit. Oleum limonis is also obtained by expression but is an essential oil. The officinal fats and oils are as follows:—

FATTY BODIES.

OLEUM MYRISTICÆ EXPRESSUM.

(Got by expression and heat from the nutmeg *Myristica officinalis*.)

OLEUM THEOBROMÆ.

(Got by expression and heat from the seeds of cacao *Theobroma cacao*.)

CETACEUM.

(Got from the head of *Physeter macrocephalus* the sperm whale.)

CERA FLAVA.

(The prepared honey-comb of the Bee, *Apis mellifica* and other species.)

CERA ALBA.

(Consists of yellow-wax bleached by exposure.)

ADEPS PREPARATUS.

(The purified fat of the pig *Sus scrofa*.)

ADEPS BENZOATUS.

(Made by heating lard over a water bath with Benzoin.)

SEVUM PREPARATUM.

(The purified fat of the sheep, *Ovis aries*.)

OILS.

OLEUM LINI.

(The oil expressed from the seeds of Flax, *Linum usitatissimum*.)

OLEUM AMYGDALÆ.

(The oil expressed from the seeds of either *Amygdala dulcis* or *A. amara*.)

OLEUM CROTONIS.

(The oil expressed from the seeds of *Croton tiglium*.)

OLEUM OLIVÆ.

(The expressed oil of the fruit of *Olea Europea*.)

OLEUM RICINI.

(The oil expressed from the seeds of *Ricinus communis*.)

EXTRACTUM FILICIS LIQUIDUM.

(Consists of a dark coloured fixed oil, with some volatile oil and resin. Got by exhausting the rhizome of *Aspidium Filix-mas* with ether and recovering the ether by distillation.)

Cocoanut oil, the product of *Cocos nucifera*, is also a soft fat.

Volatile Oils.—These preparations are sometimes called *Essential oils*, and are distinguished from fixed oils by their odour, and by the stain which they communicate to paper being removed by heat. They exist in the leaves, flowers and bark of plants, and are usually extracted by distillation with water. The process requires to be conducted with great care, as a high temperature impairs the colour and fragrance of the oil and gives it an empyreumatic odour. As a rule the oil floats on the top of the water which passes over with it in the state of vapour from the still, but in some cases, such as *caryophylli oleum*, it sinks being heavier than water. Essential oils should be kept in well stoppered bottles, as the contact of the air is injurious. They are used in medicine as flavouring agents, antispasmodics, carminatives, stimulants, &c. They are employed in four forms as follows :—

a. In the pure state as *Oleum cinnamomi.*

b. In the form of an aqueous solution as *Aqua cinnamomi.*

c. In solution in spirit of wine as *Essentia anisi.*

(The strength of the essence is 1 part of oil to 4 of spirit.)

d. In solution in spirit of wine as *Spiritus lavandulæ.*

(The strength of the spirit made from an essential oil is 1 part of oil to 49 of spirit of wine.)

OLEUM ANETHI* from the fruit of *Anethum graveolens.*

OLEUM ANISI from the fruit of *Pimpinella anisum.*

,, CAJUPUTI from the leaves of *Melaleuca minor.*

CAMPHORA† a stearopten got from camphor-oil by exposure to the air. The oil is derived from the wood of *Camphora officinarum.*

OLEUM CARUI from the fruit of *Carum carui.*

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* Unless otherwise specified it is to be understood, that the oils are got by distillation with water.

† Another stearopten, viz., *Thymol* which is got from Thyme, *Thymus vulgaris*, has lately been attracting much attention on account of its powerful disinfecting properties. Curious to say it has been made in India from time immemorial from *Omum oil*, and sold under the name of *Ajwain-ka-phul.*

OLEUM CARYOPHYLLI from cloves, the flower-buds of *Caryophyllus aromaticus.*

„ CINNAMOMI from cinnamon, the bark of *Cinnamomum zeylanicum.*

„ COPAIBÆ from copaiva the product of *Copaifera multijuga.*

„ CORIANDRI from the fruit of *Coriandrum sativum.*

„ CUBEBÆ from cubebs the fruit of *Cubebeba officinalis.*

„ JUNIPERI from the unripe fruit of *Juniperus communis.*

„ LAVANDULÆ from the flowers of Lavender *Lavandula vera.*

„ LIMONIS got by expression or distillation from the fresh rind of *Citrus limonum.*

„ MENTHÆ PIPERITÆ from fresh flowering Peppermint *Mentha piperita.*

„ „ VIRIDIS from fresh flowering Spearmint *Mentha viridis.*

„ MYRISTICÆ from Nutmeg *Myristica officinalis.*

„ PIMENTÆ from the berries of *Eugenia pimenta.*

„ ROSMARINI from flowering tops of Rosemary *Rosmarinus officinalis.*

„ RUTÆ from the fresh herb *Ruta graveolens.*

„ SABINÆ from fresh and dried tops of *Juniperus sabina.*

„ SINAPIS from the seeds of *Sinapis nigra.*

„ TEREBINTHINÆ from Turpentine the produce of *Pinus palustris* and other pines.

Gum.—Is a common vegetable product, especially in India where it exists in many common trees. The usual mode of extraction is by making incisions in the bark, from which the gum flows and dries by exposure. It sometimes exudes spontaneously through rifts in the bark. Some gums, such as gum-arabic, are soluble in water. Others, such as tragacanth, are insoluble, but swell up and form a gelatinoid mass when macerated in water. The two officinal gums, are demulcent.

ACACIÆ GUMMI from *Acacia arabica* and other species of *acacia.*

TRAGACANTHA from *Astragalus verus.*

Resins, oleo-resins, Gum-resins and Balsams.—These substances are more or less allied and widely diffused throughout the vegetable kingdom.

Resins generally occur in plants in connection with volatile oils, which are eliminated by simple exposure to the air or by distillation. *Pix burgundica* is an example of a resinous exudation solidified by simple exposure, and *Resina* of one procured by the removal by distillation of the volotile oil, viz. turpentine. Resins are dry, brittle and insoluble in water, but more or less soluble in alcohol, ether and fixed and volatile oils. They may be prescribed in the form of emulsion. The *Oleo-resins* are products consisting of a mixture of a resin and an essential oil. Copaiba is an example of an article of this class. *Gum-resins* contain a resin or oleo-resin mixed with gum, and assafœtida is an example of a gum-resin. *Balsams*, correctly speaking, are oleo-resins which yield benzoic or cinnamic acid, but the term is often misapplied, as in the case of copaiba.

RESINS.

RESINA, the residue of the distillation of turpentine from species of *Pinus* and *Abies*.

GUAIACI RESINA, got by natural exudation, incision or heat from the stem of *Guaiacum officinale*. Is probably a mixture of several substances.

MASTICHE got by incision from the stem of *Pistacio lentiscus*.

PIX BURGUNDICA, an exudation from the stem of *Abies excelsa*, the Spruce fir.

PODOPHYLLI RESINA contains a resin and the hydrochlorate of berberine, and is got from an alcoholic extract of the rhizome of *Podophyllum peltatum* by adding hydrochloric acid, which causes the resin to be slowly precipitated.

OLEO-RESINS.

COPAIBA got by incision from the stem of *Copaifera multijuga*.

ELEMI, an exudation from an unknown tree in Manilla.

PIX LIQUIDA got by destructive distillation from the wood of *Pinus sylvestris* and other pines.

TEREBINTHINA CANADENSIS, an exudation from the trunk of *Abies balsamea*.

THUS AMERICANUM, the product of *Pinus Tœda* and *P. palustris*.

GUM-RESINS.

AMMONIACUM, an exudation from the stem of *Dorema ammoniacum*.

ASSAFŒTIDA, an exudation from incisions in the living root of *Narthex-assafœtida*.

CAMBOGIA, an exudation from the stem of *Garcinia morella*.

GALBANUM, the product of a species of *Ferula*.

MYRRHA, an exudation from the stem of *Balsamodendron Myrrha*.

SCAMMONIUM, an exudation got by incision from the living root of *Convolvulus scammonia*.

BALSAMS.

BENZOINUM, an exudation from incisions in the bark of *Styrax benzoin*.

BALSAMUM PERUVIANUM, a product of *Myroxylon Pereiræ*.
,, TOLUTANUM a product of *Myroxylon Toluifera*.

STYRAX PRÆPARATUS, an exudation from the bark of *Liquidambar orientale*.

Amylaceous and Saccharine Substances.—Sago, arrowroot and tapioca are good examples of starch, and cane sugar forms an example of the saccharine group. Starch is common in the seeds of some plants such as rice, and in the roots or tubers of others such as the potato. Starch is convertible into *Dextrin* or *British-gum* and also into grape-sugar. It forms a very delicate test for iodine, but when used for this purpose it must be in the state of mucilage. When free iodine is present in solution it yields a blue colour on the addition of starch. Starch is not properly speaking soluble in water, although by long boiling of the mucilage of starch a portion of it becomes altered and dissolved. Sugar on the other hand is soluble in water, and by the action of a ferment yields alcohol and carbonic acid. The chief forms of sugar are

Cane sugar or *sucrose*,
Grape sugar or *glucose*,
Milk sugar or *lactose*.

The following are the officinal articles of this group :—

AMYLUM, starch, got from the flour of common wheat *Triticum vulgare*.

SACCHARUM PURIFICATUM, purified sugar, got from the juice of *Saccharum officinarum*.

SACCHARUM LACTIS, milk sugar, got from the whey of goats' milk by evaporation.

EXTRACTUM GLYCYRRHIZÆ, got from the root of *Glycyrrhiza glabra*.

MANNA, an exudation from the stem of *Fraxinus ornus* and *F. rotundifolia*; consists of *mannite*, with sugar and extractive.

THERIACA, the residue of the refining of sugar.

Glucosides or Neutral Principles.—These are so called because when boiled with dilute acid they yield *glucose* or *grape-sugar* and another substance. They are generally bitter in taste and some of them are useful remedies. Properly speaking tannin or tannic acid, which is extensively diffused throughout the vegetable kingdom, is a glucoside, but it is more conveniently grouped with the acids. The following are the medicinal glucosides :—

DIGITALINUM ($C_{27} H_{45} O_{15}$).

(The active principal of *Fox-glove* or *Digitalis purpurea.*)

JALAPINUM, the substance usually sold as *Jalapin* is simply *Jalapæ resina* decolorised by charcoal.

SANTONINUM ($C_{15} H_{18} O_3$).

(Got from *Santonica* the unexpanded flower-heads of a species of *Artemisia*).

CHAPTER III.

Operations of Pharmacy, and Pharmaceutical Preparations.

The processes, by which crude drugs are rendered fit for use as remedies, are called the operations of pharmacy, and are as follows :—

55. *Crystallisation.*—Many chemical substances, in passing from a fluid or gaseous to a solid form, assume mathematical forms, called crystals. A knowledge of the forms assumed by the crystals of different medicinal substances is of great practical value, as it aids the expert in distinguishing one officinal salt from another. Volatile solids may be caused to assume the crystalline form by sublimation, but crystals are more commonly got by the evaporation, at a natural or artificial temperature, of a fluid holding a solid in solution. The vessels best suited for crystallisation from an aqueous solution are shallow *evaporating dishes.* The process is promoted by rest, and is also sometimes aided by the introduction of a solid substance, such as a thread, into the solution. The size, form and colour of crystals are a good deal influenced by the purity and strength of the solution from which they are recovered, and by the slowness and uniformity of the evaporating process. Crystals as a rule contain some water, called the water of crystallisation, to get rid of which the process of *exsiccation* is employed. Salts which absorb water from the air, and dissolve spontaneously are called *deliquescent; Ex.* Acetate of potash. Those which part with their water of crystallisation on exposure, becoming powdery, are termed *efflorescent; Ex.* Alum. Both these processes are deleterious, as they gradually destroy the crystalline form of the salts, and alter their medicinal powers. Salts which undergo no change in air are called *permanent.*

56. *Decoction.*—In preparing a decoction, the vegetable substance to be acted on is put into boiling water, and the temperature kept up for a specified period. The fluid thus obtained is then strained, to get rid of the solid particles, and when cold is fit for use. In some cases the high temperature is apt to decompose the active principles, or to dissipate the aromatic properties of medicines. Decoctions do not keep well, and should therefore be made as required.

57 *Digestion.*—Is a process for dissolving out the active ingredients of any substance in a fluid, which is kept at a temperature of from 90° to 100° Fhr. It is constantly had recourse to in the preparation of infusions.

58. *Distillation.*—Is a process by which fluids are converted into vapour by the application of heat, and subsequently condensed, or returned to the fluid state again, by the influence of cold. It is employed for the separation of fluids from each other, which are converted into vapour at different temperatures, and chiefly with the object of preserving the more volatile. Distillation may be conducted on a small scale by means of a glass retort heated by a spirit lamp or sand bath, and condensation effected by inserting a glass tube into the beak of the retort, so as to lengthen its neck. The tube is then covered with a piece of rag and a small stream of cold water allowed to trickle on it, so as to maintain a low temperature. At the lower end of the tube a bottle or other convenient vessel must be placed, as a receiver, to catch the condensed vapour. A more efficient condenser, however, is shown in Fig. 24, which consists of a piece of apparatus called a Liebig's condenser fixed on a retort stand, and having freedom of motion in every direction. In this condenser there are two tubes. One is small, for conveying the vapour from the retort or still, and is made to pass through another which is of such diameter as to leave some space between the two. The outer one is usually made of brass or tin, and is fitted tightly on the glass tube by means of a perforated cork, inserted at each end. The other parts of the apparatus are as follows: a heavy cast iron foot *x*. in which is fixed an upright circular iron rod *z* to support the condenser, the usual ring supports *e e*, and a special clip or holder *a*. When in use, the beak of the retort is fitted to the upper end of the small inner tube of the condenser. The cistern, Fig. 23, containing cold water, is then placed so that the stop-cock will be immediately over the funnel mouth of the tube *c*. A stream of water is then let on, and entering *c* cools the central glass tube, and as it gets heated finally escapes by *d*. In this way the tube leading from the still is constantly kept at a low temperature, and the effectual condensation of the vapour escaping from the retort secured. For distillation on a larger scale the apparatus shown in Fig. 25 will be found very convenient. It con-

sists of a copper still *a*, *b*, tinned on the inside, and adapted to a furnace. The latter has two valves or doors,

Fig. 23.

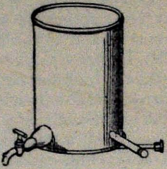


Fig. 24.

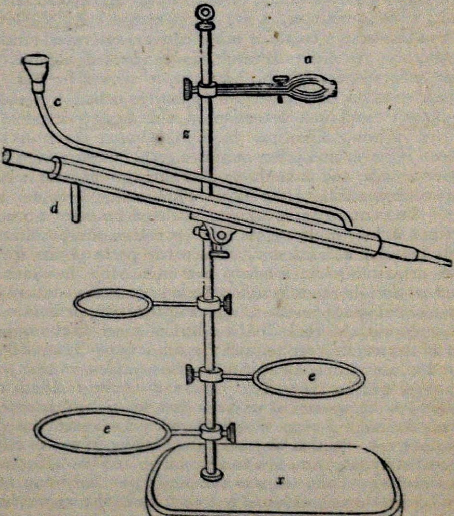
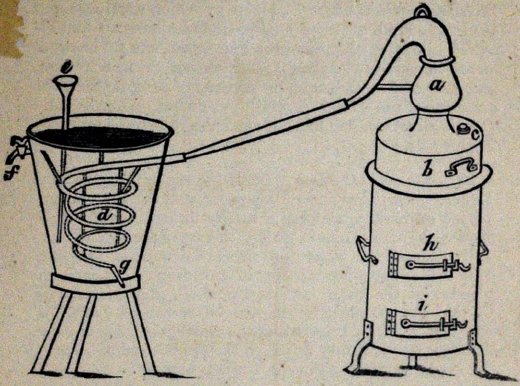


Fig. 25.



at *h* and *i*. for the introduction of fuel, ventilation, &c. The still has a collar at *b* by which it is supported on the top of the furnace, a moveable head *a* which can be taken off when it is necessary to clean out the interior and a small opening at *c*, fitted with a screw plug, through which fresh quantities of fluid can be poured in while distillation is going on. The condensing apparatus consists of a tub for holding cold water, and a spirally twisted tube *d*, the *worm*, connected with the beak of the still. A constant stream of cold water enters the tub by the funnel *e*, and the heated water escapes by the stop-cock *f*. The vapour on leaving the still enters the worm, and being condensed, by the low temperature of this part of the apparatus, escapes as a fluid at *g*. When the first distillation of a fluid does not completely purify it or bring it up to the required strength, the process may be repeated. This is called *rectification*, and as it is conducted at a low temperature a high degree of purity is obtained, only the very volatile constituents of the fluid passing over; *Ex.* Spiritus

rectificatus. Many of the officinal *Waters*, all the *Essential oils* and some of the *Spirits* are prepared by distillation. *Destructive distillation* is a process by which organic bodies are by the application of heat entirely broken up, and resolved into simpler products. The substances to be acted on are introduced into close earthenware or iron retorts, and subjected to a gradually increasing temperature, the air meanwhile being carefully excluded. Acetic acid (*pyroligneous* and tar furnish examples of articles prepared in this way.)

59. *Elutriation.*—Is a process for separating the fine from the coarse particles of a powder, and can only be employed in cases in which the article is not dissolved or injured by immersion in water. The powder is first carefully diffused in water, on which the coarser particles sink while the finer remain in suspension. The upper portion of the water is then poured off, and carries with it the fine powder, which can be recovered by allowing it to settle and decanting the water when it gets clear. The powder is finally dried by the application of heat, or by exposure to the sun; *Ex.* Creta preparata.

60. *Evaporation.*—Is a process for getting rid of fluids, which in this case is effected by converting them into vapour, by the application of heat. It may be conducted at any temperature up to that of the boiling point; and is used in making extracts to bring them to the proper consistence, in recovering salts from solutions, &c.

61. *Expression.*—Is an operation by which vegetable juices are squeezed out of the leaves &c. of plants. The extraction of the juice of a lime is an example of expression, and the lime-squeezer of a simple apparatus for the purpose. Many extracts and fixed oils are prepared from vegetable substances by this process, the pressure being applied by means of a screw or hydraulic press. In the absence of a press, the juice of leaves may be effectually expressed by reducing them to pulp in a mortar, placing them in this state in a strong towel and twisting the ends in opposite directions. The process of expression is also used for recovering, by pressure, the last portions of fluid left in the coarse powder which remains when preparing

tinctures by maceration; *Ex.* Tinctura belladonnæ. The apparatus used for this purpose is the *Tincture Press*, described at page 20.

62. *Exsiccation.*—This is a process by which salts are by the action of heat deprived of their water of crystallisation. A salt subjected to this operation loses its crystalline shape and becomes lighter, as in the case of Sodæ carbonas exsiccata.

63. *Filtration.*—Is the separation of a solid from a fluid in which it is not dissolved, but merely diffused or held in suspension. The filter is made of some substance sufficiently porous to permit of the passage of the fluid, but close enough to arrest the solid particles. It may be made (§ 32) of flannel, calico, paper, sand, powdered glass or charcoal. The object of filtration may be to obtain a solid and get rid of a liquid, but it is more commonly resorted to with the view of separating solid particles from a fluid in which they are suspended. The liquid got by this process is called the *filtrate*. The common water filter of this country, consisting of layers of charcoal and sand, is a familiar example of a filtering apparatus. *Straining* is a modification of filtration, but in it the fluid is passed through more quickly by means of pressure, and the particles of the solid are not so completely removed.

64. *Infusion.*—In this process boiling water is poured on a vegetable substance, and digestion carried on for a specified time, with the view of extracting the active properties of the drug. The fluid is then strained and fit for use. The preparation of tea is a familiar example of the process. Sometimes cold water is used, as boiling water would extract matters which it may be desirable to exclude; *Ex.* Infusum calumbæ. A common stoneware jug with a cover makes a very good infusion pot, but the best form is Squire's described at page 20.

65. *Levigation.*—Is a process for reducing a coarse to a fine powder, with the aid of some fluid in which the article is insoluble. The crude powder is moistened, say with water, and then triturated in a mortar or rubbed on a stone slab with a roller or muller, and the presence of the fluid materially aids in the process of reduction.

66. *Maceration.*—In this process some solid substance, such as a root, is steeped in a fluid at the natural temper-

ature of the air, until its active ingredients have been extracted, or its substance softened so as to facilitate their extraction. The tinctures of opium and quassia, and the infusions of calumba and quassia are prepared in this way.

67. *Percolation.*—In this process the soluble matter of a drug is extracted by placing it in a powdered state in a tall cylinder, and allowing a fluid to filter or percolate through it slowly. The necessary apparatus, &c., have already been noticed in §§ 28 and 29. It is a common and very efficient mode of preparing tinctures, as it has the advantages of exhausting vegetable substances of their soluble matter more speedily, more thoroughly and with a smaller amount of fluid than any other process. The success of the operation depends greatly on the nature of the drug, its state of division and the manner in which it is packed in the percolator. Substances which are apt to form a pulpy mass, when moistened, are not well suited for percolation. As to the state of division the powder must be rather coarse; and it should be packed uniformly throughout and not too densely.

68. *Precipitation.*—Is a process by which a solid in solution is thrown down from a fluid in the form of crystals, as an amorphous powder, or in a moist tenacious mass. This may be effected by adding to a solution of one substance that of another, which has a strong chemical affinity for it, and which, by combining with it, precipitates an insoluble compound. Hydrargyrum ammoniatum and Hydrargyri iodidum rubrum are prepared in this way. Precipitation may also be produced by effecting some change in the fluid that holds a substance in solution, as when the resin of podophyllum is precipitated from the rectified spirit used in its preparation, by the addition of water. The substance thrown down is termed the *precipitate*, and the agent producing the result the *precipitant*. The density of the precipitate depends on the strength of the solutions used. Deep beakers, somewhat wider at the bottom than the top, are the vessels best suited for this operation.

69. *Pulverisation.*—Is a process for reducing solids to the state of powder. On a small scale pulverisation is effected by means of a mortar and pestle, but on the large

scale mills are employed. If the substance be very hard or tough and fibrous, as barks or roots, a metal mortar should be used. Astringent substances, however, such as rhatany root or catechu, must not be reduced in iron mortars, otherwise a tannate of iron is formed, and the powder acquires a black colour. For substances not too hard a wedgewood, glass or porcelain mortar may be used. In using the metal mortar too much of the article to be powdered should not be put into it at a time, and when charged, the pestle should be brought down perpendicularly right in the centre, each successive blow being aimed at the same spot. When part of the charge has been properly reduced, the fine powder should be separated by sifting from the coarser, and the latter again returned to the mortar for further pulverisation. It is sometimes necessary to have a cover to the mortar, more especially if the drug be of an irritating character, as the finer particles of the powder get suspended in the air and irritate the eyes and nostrils. The cover may be of wood with a hole in the centre for the pestle, or in the form of a conical leather bag the broad end of which is secured to the brim of the mortar. The pestle is then passed through a hole in the top of the bag, and secured to it by a lashing of cord. The bag must be of sufficient length to allow the pestle to be used freely. In using wedgewood or glass mortars contusion or perpendicular blows must not be resorted to, but the substance should be reduced by *trituration*, that is by the rotation of the pestle round the mortar with firm pressure. When the contents cake and cling to the sides of the mortar and to the pestle, they must be removed and brought into the centre by means of a flexible spatula. Some drugs, such as opium and gum resins, require to be highly dried before they can be reduced to powder. Others such as myrrh and assafœtida part with their volatile ingredients when powdered, and are therefore injured by the process. Camphor is difficult to powder by simple trituration, but is easily reduced when spirit, in the proportion of one minim to every 3 grains, is added. It does not however keep well when powdered unless mixed with some dry powder, such as chalk. Some drugs cannot be readily powdered either by trituration or contusion. Thus nutmeg is reduced by a tin grater, and

some roots, &c., are cut into slices or chips. Most articles sustain some loss in the process of powdering.

70. *Sifting.*—In reducing a substance to powder it is necessary, from time to time, to separate the finer from the coarser particles, and this is done by means of sieves, having bottoms of wire guaze, haircloth or muslin, of various degrees of fineness. The apparatus consists of 3 parts viz., the sieve or sifter, a cover to prevent the finer particles of the powder from escaping, and a bottom to receive the powder as it passes through.

71. *Solution.*—Is a process by which the cohesion of the particles of a solid are overcome by the action of a fluid, the atoms being diffused in the liquid, and so separated as to become invisible. In such a condition the particles of a solid are much more susceptible of chemical action, and produce their medicinal effects much more readily than in the state of powder. Water is the article most commonly used as a solvent, but Alcohol, Ether, &c., are also employed. Hot water, as a rule, dissolves substances more readily than cold, but there are exceptions, as in the case of Lime and Chloride of sodium. Articles are much more easily dissolved when in the state of powder, and, accordingly, the best way of proceeding is to reduce the solid to powder in a mortar, and then to pour on a small quantity of the solvent and continue rubbing. When this has become saturated, that is has taken up as much as it can hold, it should be poured off and fresh portions of the liquid added and decanted, until the whole has been dissolved. When only a small quantity of a solid has to be dissolved and it is readily soluble, it may at once be put into a phial containing the proper quantity of fluid, and the contents shaken until solution has been effected. When a solid can be recovered from a solvent by evaporation or other means, without having undergone any chemical change, it is said to be held in *simple solution.* Common salt dissolved in water is an example of such a solution. When the solid under- goes some chemical change, as in the case of quinine dissolved in water by means of sulphuric acid, the solution is termed a *chemical* one. During the process of solution a considerable reduction of temperature often takes place, and this effect

is often taken advantage of for making frigorific mixtures. Thus nitre, rapidly dissolved in water, is frequently used in India when ice is not procurable for cooling wines, &c.

72. *Sublimation.*—Is a process by which volatile principles are separated from solids, by the application of heat. The volatile principle is first converted into dry vapour in a subliming vessel, and then reduced to the solid form by the application of cold in a condenser. Calomel, sulphur, camphor, benzoic acid, &c., are prepared or purified in this way. In making benzoic acid, the benzoin should be put in a shallow iron pot, covered with a diaphragm of porous paper and surmounted with a cone of glazed paper. The pot should then be heated on a sand bath, and as the temperature rises the acid will pass through the paper diaphragm in vapour and become condensed in the cool glazed cone.

Pharmaceutical Preparations, or Officinal Formulæ.

73. These are preparations, such as tinctures, extracts and plasters, kept ready for use, and made up according to the directions given in the pharmacopœia. The aim in drawing up the rules of the pharmacopœia has been to make the various preparations as simple and effective as possible, and capable, generally, of being kept without deterioration for a reasonable length of time.

74. *Acids.*—These are substances having an acid or sour taste, and the property of changing vegetable blues, such as litmus solution, to red. They are often of an acrid or corrosive nature, and always contain hydrogen combined with some substance which usually contains oxygen. Alkalies have the power of neutralising acids, and of restoring the blue colour to litmus paper which has been reddened by the action of an acid. Acids are spoken of as *mineral* or *vegetable* according to the source from which they are derived. The *dilute acids* of the pharmacopœia contain a certain amount of water, which is added with the view of rendering them more suitable for medicinal and pharma-

ceutical purposes. The proportion of water varies in every case. The dilute acids of the pharmacopœia are :—

Acidum aceticum dilutum	... Dose	1 *to* 2 *drs.*
„ hydrochloricum dilutum	... „	10 *to* 30 *minims.*
„ hydrocyanicum dilutum	... „	2 *to* 8 „
„ nitricum dilutum ...	... „	10 *to* 30 „
„ nitro-hydrochloricum dilutum.	„	5 *to* 20 „
„ phosphoricum dilutum	... „	10 *to* 30 „
„ sulphuricum dilutum	... „	5 *to* 20 „
„ „ aromaticum	... „	5 *to* 30 „

75. The mineral acids must be kept in glass stoppered bottles, as they destroy corks. They also act injuriously on the teeth, and should therefore be prescribed in rather a dilute state, and the patient be directed to suck the dose through a glass tube or quill. In their concentrated state they are highly destructive corrosive poisons. The antidotes in case of poisoning by an acid are solutions of non-corrosive alkalies and oily fluids, and in emergencies a strong solution of soap in water may be administered. The following is a list of the officinal acids, exclusive of the dilute acids, which have already been enumerated :—

Acidum aceticum ...	... *only externally.*	
„ „ glaciale	... „	„
„ arseniosum ...	... Dose	$\frac{1}{60}$ *to* $\frac{1}{12}$ *gr.*
„ benzoicum ...	... „	10 *to* 15 „
„ carbolicum ...	... „	1 *to* 3 „
„ citricum ...	... „	10 *to* 30 „
„ gallicum ...	... „	2 *to* 10 „
„ hydrochloricum	... *only externally.*	
„ nitricum ...	... „	„
„ sulphuricum ...	... „	„
„ sulphurosum ...	... Dose	$\frac{1}{2}$ *to* 1 *dr.*
„ tannicum ...	... „	2 *to* 10 *gr.*
„ tartaricum ...	... „	10 *to* 30 „

76. *Alkalies* are substances which neutralise acids and turn red litmus solution into blue. They also combine with acids to form salts, which may be alkaline, acid or neutral, according to the amount of acid they contain. The alkalies are soluble hydroxides of metals, &c., and those used in medicine are derived from *Potassium, Sodium, Lithium*

the hypothetical substance *Ammonium*, and *Calcium* a metal of an alkaline earth. The following is a list of the officinal articles, having an alkaline reaction, which belong to this class :—

POTASSIUM COMPOUNDS.

Potassa caustica.	*only externally.*
Potassæ bicarbonas	*Dose* 10 *to* 40 *gr.*
,, carbonas	,, 10 *to* 30 ,,
,, liquor	,, 15 *to* 60 *minims.*
,, ,, effervescens ...	,, 5 *to* 10 *oz.*

SODIUM COMPOUNDS.

Soda caustica.	*only externally.*
Sodæ bicarbonas	*Dose* 10 *to* 60 *gr.*
,, carbonas...	,, 10 *to* 30 ,,
,, ,, exsiccata ...	,, 3 *to* 10 ,,
,, liquor	,, ½ *to* 1 *dr.*
,, ,, effervescens ...	*Half a pint contains* 15 *gr.*

LITHIUM COMPOUNDS.

Lithiæ carbonas	*Dose* 3 *to* 6 *gr.*
,, liquor effervescens ...	,, 5 *to* 10 *oz.*

AMMONIUM COMPOUNDS.

Ammoniæ liquor	*Dose* 10 *to* 20 *minims.*
,, ,, fortior.	*only externally.*
,, spiritus aromaticus.	,, 20 *to* 60 ,,
,, carbonas	,, 3 *to* 10 *gr.*

CALCIUM COMPOUNDS.

Calx.	
Calcis carbonas præcipitata ...	*Dose* 10 *to* 60 *gr.*
,, hydras.	
,, liquor	,, 1 *to* 4 *oz.*
,, ,, saccharatus ...	,, 15 *to* 60 *minims.*
Creta.	
,, preparata	,, 10 *to* 60 *gr.*
Cretæ mistura	,, 1 *to* 2 *oz.*
,, pulvis aromaticus. ...	,, 10 *to* 60 *gr.*

77. *Aqua.*—All the officinal waters, except Aqua camphoræ, are prepared by distillation, and all the remainder,

with the exception of Aqua destillata, are rendered medicinal by distilling vegetable substances. Nearly all the waters are thus simple solutions of essential oils, and on these their therapeutical effects depend. In preparing them the substance to be acted upon is, if a solid, bruised or reduced to a coarse powder, put into the still with a sufficiency of water and then macerated for a certain time. Heat is then applied, on which the water and essential oil pass over in the state of vapour and are condensed in the usual way. The Aquæ of the pharmacopœia are, excluding natural water, 13 in number, and may be classified as follows:—

1. *By distilling a single article.*

Aqua destillata.

2. *By dissolving a substance in cold water.*

Aqua camphoræ ... *Dose* 1 *to* 2 *oz.*
„ chloroformi ... „ ½ *to* 2 „

3. *By distilling a bark with water.*

Aqua cinnamomi ... „ 1 *to* 2 *oz.*

4. *By distilling a fruit with water.*

Aqua anethi ... „ ½ *to* 1 *oz.*
„ carui ... „ 1 *to* 2 „
„ fœniculi ... „ 1 *to* 2 „
„ pimentæ ... „ 1 *to* 2 „

5. *By distilling the fresh leaves with water.*

Aqua laurocerasi. *Dose* 5 *to* 30 *mins.*

6. *By distilling the fresh flowers with water.*

Aqua aurantii floris. *Dose* ½ *to* 1 *oz.*
„ rosæ ... „ 1 *to* 2 „
„ sambuci.

7. *By distilling the essential oil with water.*

Aqua menthæ piperitæ... *Dose* 1 *to* 2 *oz.*
„ „ viridis ... „ 1 *to* 2 „

78. *Cataplasma.*—The Cataplasma or poultice is a soft, moist bulky preparation for external use, and generally applied warm. Its action depends on its heat and

moisture, or on the nature of the substance with which it is impregnated as in the chlorine poultice. It is usually spread on a piece of cotton cloth and should be of medium consistency, not too soft or too dry. When applied warm as an emollient, it should be changed when it begins to get cold and uncomfortable. When it is desired to lubricate the part, oil is added, as in the case of the linseed poultice. The mustard poultice is a counter-irritant and should be removed when the skin gets red, and the patient complains of the smarting. When applied to a delicate female or child, the surface of the mustard poultice should be covered with a piece of fine gauze, to facilitate its removal and to prevent any portion of it from adhering to the tender skin. When applied to a patient in an insensible state, as to the calves of the legs in a case of apoplexy, its effects on the skin should be watched, as if left on too long the irritation caused may result in troublesome ulceration. The officinal poultices are as follows:—

Cataplasma carbonis. *applied warm.*	=	Charcoal $\frac{1}{2}$ oz.: Bread 2 oz.: Linseed meal $1\frac{1}{2}$ oz.: Boiling water 10 oz.
Cataplasma conii. *applied warm.*	=	Hemlock leaf in powder 1 oz.: Linseed meal 3 oz.: Boiling water 10 oz.
Cataplasma fermenti. *applied cool.*	=	Beer yeast 6 oz.: Flour 14 oz.: Water at 100° 6 oz.
Cataplasma lini. *applied warm.*	=	Linseed meal 4 oz.: Olive oil $\frac{1}{2}$ oz.: Boiling water 10 oz.
Cataplasma sinapis. *applied warm.*	=	Mustard powder $2\frac{1}{2}$ oz.: Linseed meal $2\frac{1}{2}$ oz.: Boiling water 10 oz.
Cataplasma sodæ chloratæ. *applied warm.*	=	Solution of chlorinated soda 2 oz.: Linseed meal 4 oz.: Boiling water 8 oz.

79. *Charta.*—A preparation in which a thin layer of mustard or cantharides powder is made into a sort of plaster, on paper:—

Charta sinapis. *Moisten with tepid water before application.*	=	Black mustard in powder 1 oz.: Solut. of gutta percha 2 oz.
„ epispastica *Moisten with tepid water before application.*	=	White wax 4 oz.: Spermaceti $1\frac{1}{2}$ oz.: Olive oil 2 oz.: Resin $\frac{3}{4}$ oz.: Canada Balsam $\frac{1}{4}$ oz.: Cantharides in powder 1 oz.: Distilled water 6 oz.

80. *Confectio.*—The confection is a semi-solid preparation, having its active ingredients suspended in and preserved by honey, syrup or sugar. The terms Electuary and Conserve, which were formerly applied to similar preparations, are not now used in the pharmacopæia. There are eight officinal confections:—

Confectio opii *Dose, 5 to 20 gr.*	=	Comp. powder of opium 192 gr.: Syrup 1 oz.: Contains nearly 1 gr. Opium in 40.
„ piperis *Dose, 60 to 120 gr.*	=	Powder of black pepper 2 oz.: Caraway fruit in powder 3 oz.: Honey 15 oz. = 1 oz. in 10.
„ rosæ caninæ *Dose, 1 dr.*	=	Hips, deprived of seeds, 1 lb.: Refined sugar 2 lbs.
„ rosæ gallicæ *Dose, $\frac{1}{2}$ to 1 dr.*	=	Fresh petals 1 lb.: Refined sugar 3 lbs.
„ scammonii *Dose, 10 to 30 gr.*	=	Scammony 3 oz.: Ginger $1\frac{1}{2}$ oz.: Oil of caraway 1 dr.: Oil of cloves $\frac{1}{2}$ dr.: Syrup 3 oz.: Honey $1\frac{1}{2}$ oz. = about 1 oz. in 3.
sennæ *Dose, 60 to 120 gr.*	=	Senna, in powder, 7 oz.: Coriander 3 oz.: Figs 12 oz.: Tamarinds 9 oz.: Cassia pulp 9 oz.: Prunes 6 oz.: Extract of liquorice $\frac{3}{4}$ oz.: Sugar 30 oz.: Water a sufficiency to make the result weigh 75 oz. = about 1 oz. in 11.

Confectio sulphuris = Sublimed sulphur 4 oz.: Acid tartrate of potash 1 oz.: Syrup of Orange peel 4 oz. = 1 oz. in $2\frac{1}{4}$.
Dose, 1 *to* 2 *drs*.

" terebinthinæ = Oil of Turpentine 1 oz.: Liquorice powder 1 oz.: Honey 2 oz. = 1 oz. in 4.
Dose, 1 *to* 2 *drs*.

81. *Decoctum.*—The decoction is a watery solution of the active properties of a vegetable substance, obtained by boiling. Articles containing volatile principles or such as would be injured by a high temperature cannot be used in this form, and the boiling should never be continued longer than the period ordered in the pharmacopœia. The usual time for boiling decoctions is from 10 to 20 minutes, and they should all be strained hot, except the Decoctum aloes co., Decoctum sarsæ and Decoctum sarsæ co. which are strained when *cool*, and the Decoctum cinchonæ flavæ which is strained when *cold*. Decoctions are very liable to undergo decomposition, and should always therefore be prepared fresh as required. A flat bottomed, tinned or enamelled, sauce-pan is the most convenient vessel for making a decoction, and when the ingredients have been boiled for the requisite period, the fluid should be strained through a piece of clean cotton cloth. Both the pan and the straining cloth must be carefully cleaned after use.

Decoctum aloes co. = Extract of socotrine aloes 120 grs.: Myrrh and Saffron of each 90 gr.: Carbonate of potash 60 gr.: Extract of liquorice 1 oz.: Compound tincture of cardamoms 8 oz.: Water a sufficiency. Boil 5 minutes. = 4 grs. of aloes per oz.
Dose, $\frac{1}{2}$ *to* 2 *oz*.

" cetrariæ = Cetraria oz. 1: Water oz. 20: boil strain and make up to a pint. Boil 10 minutes. = 1 oz. in 20 oz.
Dose, 1 *to* 2 *oz*.

Decoctum cinchonæ flavæ = *Dose, 1 to 2 oz.*	Bark oz. $1\frac{1}{4}$: Water oz. 20: strain and make up to 20 oz. Boil 10 minutes. = 1 oz. in 16
,, granati radicis = *Dose, 1 to 2 oz.*	Root bark sliced, 2 oz.: Water 40 oz.: boil down to 20 oz.
,, hæmatoxyli = *Dose, 1 to 2 oz.*	Logwood 1 oz.: Cinnamon 60 gr.: Water 20 oz. Boil 10 minutes.
,, hordei = *Dose, ad. lib.*	Barley 2 oz.: Water 30 oz. Boil 20 minutes.
,, papaveris = *Used externally*	Poppy capsules, without seeds, 2 oz.: Water 30 oz. Boil 10 minutes strain and add water to make up to 20 oz.
,, pareiræ = *Dose, 1 to 2 oz.*	Pareira $1\frac{1}{2}$ oz.: Water 20 oz. Boil 15 minutes and add water to make up to 20 oz.
,, quercus = *Dose, 1 to 2 oz.*	Oak bark $1\frac{1}{4}$ oz.: Water 20 oz. Boil 10 minutes and add water to make up to 20 oz.
,, sarsæ = *Dose, 2 to 10 oz.*	Sarsaparilla $2\frac{1}{2}$ oz.: Water 30 oz. Boil 10 minutes and add water to make up 20 oz.
,, sarsæ co. = *Dose, 2 to 10 oz.*	Sarsæ $2\frac{1}{2}$ oz.: Sassafras $\frac{1}{4}$ oz.: Guaiacum wood $\frac{1}{4}$ oz.: Liquorice root $\frac{1}{4}$ oz.: Mezereon 60 gr.: Water 30 oz. Boil 10 minutes and add water to make up to 20 oz.
,, scoparii = *Dose, 2 to 4 oz.*	Dry broom tops 1 oz.: Water 20 oz. Boil 10 minutes.

Decoctum taraxaci *Dose, 2 to 4 oz.*	=	Dandelion root 1 oz.: Water 20 oz.: Boil 10 minutes and make up to 20 oz.
,, ulmi *Dose, 2 to 4 oz.*	=	Elm bark $2\frac{1}{2}$ oz.: Water 20 oz.: Boil 10 minutes and make up to 20 oz.

82. *Emplastrum.*—A plaster is a preparation of such consistence and adhesiveness, that when warmed and applied to the skin it adheres more or less firmly. It is used for various purposes, viz.:—

1. To give mechanical support. (*Ex.* Emplast. resinæ.)
2. To produce counter-irritation. (*Ex.* Emplast. calefaciens.)
3. To produce special medicinal effects. (*Ex.* Emplast. hydrargyri.)

Plasters are spread on leather, silk or cotton cloth, and full instructions as to the method of preparing them will be found in a subsequent chapter. Plasters spread on leather are chiefly such as are intended to remain on for some time and produce counter-irritation, or to have some special medicinal effect such as emplast, calefaciens and emplast. belladonnæ. As a rule plasters intended to have medicinal effects or to produce counter-irritation are made as required, as they do not keep well when spread. The following is a list of officinal plasters:—

Emplastrum ammoniaci cum hydrargyro	=	Ammoniacum 12 oz.: Mercury 3 oz.: Olive oil 1 dr.: Sulphur 8 gr.
,, belladonnæ	=	Extract of Belladonna 3 oz.: Resin plaster 3 oz.: Rectified spirit 6 oz.
,, calefaciens	=	Cantharides 4 oz.: Boiling water 20 oz.: Expressed oil of nutmeg 4 oz.: Yellow wax 4 oz.; Resin 4 oz.: Soap plaster 52 oz.; Resin plaster 32 oz.

Emplastrum cantharides	=	Cantharides powder 12 oz.: Yellow wax $7\frac{1}{2}$ oz.: Suet $7\frac{1}{2}$ oz.: Resin 3 oz.: Lard 6 oz.
,, cerati saponis	=	Hard soap 10 oz.: Yellow wax $12\frac{1}{2}$ oz.: Oxide of Lead 15 oz.: Olive oil 20 oz.: Vinegar 160 oz.
,, ferri	=	Hydrated peroxide of Iron 1 oz.: Burgundy Pitch 2 oz.: Lead plaster 8 oz.
,, galbani	=	Galbanum 1 oz.: Ammoniacum 1 oz.: Yellow wax 1 oz.: Lead plaster 8 oz.
,, hydrargyri	=	Mercury 3 oz.: Olive oil 1 dr.: Subl. sulphur 8 gr.: Lead plaster 6 oz.
,, opii	=	Opium 1 oz.: Resin plaster 9 oz.
,, picis	=	Burgundy Pitch 26 oz.: Frankincense 13 oz.: Resin and yellow wax of each $4\frac{1}{2}$ oz.: Expressed oil of nutmeg 1 oz.: Olive oil 2 oz.: Water 2 oz.
,, plumbi	=	Oxide of lead 4 lb.: Olive oil 1 gal.: Water $3\frac{1}{2}$ pints.
,, plumbi iodidi	=	Iodide of lead 1 oz.: Soap-plaster 4 oz.: Resin plaster 4 oz.
,, resinæ	=	Resin 4 oz.: Lead plaster 32 oz.: Hard soap 2 oz.
,, saponis	=	Hard soap 6 oz.: Lead plaster 36 oz.: Resin 1 oz.

83. *Enema.*—The enema, or clyster, is a fluid preparation for injection into the rectum by means of a common

pewter syringe, brass syringe with flexible tube or other suitable apparatus. Before introducing the pipe or tube it should be warmed and well oiled, and care must be taken in passing it up not to injure the gut, especially in the case of children. The fluid should be injected slowly, as when thrown up with great force it is apt to be immediately rejected. Only a sufficiency for one enema is to be dispensed at once, and the bottle should be carefully labelled, so that a mistake may not occur as to the nature of its contents. Enemas containing opiates, or other active ingredients which are intended to be absorbed, should be small in bulk, say 1 to 3 ounces. Purgative enemas should on the contrary be rather large, as the mere mechanical distention of the bowel by the fluid promotes evacuation. The quantity of the fluid also requires to be modified according to the age of the patient:—

Age of Patient.	*Quantity of fluid.*
1 to 5 years old	3 to 4 oz.
10 to 15 do.	6 to 8 oz.
An adult	12 to 16 oz.

The following are the 6 officinal enemas, the quantity in each case being sufficient for one enema:—

Enema aloes	=	Aloes 40 gr.: Carbt. of potash 15 gr.: Mucilage of starch 10 oz.
,, assafœtidæ	=	Assafœtida 30 gr.: Water 4 oz.
,, magnesiæ sulphatis	=	Sulph. of magnesia 1 oz.: Olive oil 1 oz.: Mucilage of starch 15 oz.
,, opii	=	Tinct. of opium ½ dr.: Mucilage of starch 2 oz.
,, tabaci	=	Leaf tobacco 20 gr.: Boiling water 8 oz.: infuse and strain.
,, terebinthinæ	=	Oil of turpentine 1 oz.: Mucilage of starch 15 oz.

84. *Essentia.*—There are two essences in the pharmacopœia, viz., of anise and peppermint. Both are alcoholic solutions of an essential oil, and are made by adding one part of the oil to four of rectified spirit. The essence is a convenient and economical form for the administration of carminative volatile oils :—

Essentia anisi *Dose,* 10 *to* 20 *min.*	=	Oil of Anise 1 oz. : Rect. spirit 4 oz.
,, menthæ piperitæ *Dose,* 10 *to* 20 *min.*	=	Oil of peppermint 1 oz. : Rect. spirit 4 oz.

85. *Extractum.*—Extracts are preparations of a fluid or of a pilular consistence, and contain the active properties of vegetable substances separated by one or other of the following processes :—

1st. By expressing the juice of fresh parts of plants, such as the leaves	=	*Fresh or Green extracts.*
2nd. By acting on dry vegetable substances with cold or boiling water	=	*Aqueous extracts.*
3rd. By acting on vegetable substances with spirit	=	*Alcoholic extracts.*
4th. By acting on vegetable substances with ether	=	*Etherial extracts.*
5th. By acting on vegetable substances with acetic acid	=	*Acetic extracts.*
6th. By acting on vegetable substances with water or ether and then adding spirit	=	*Fluid extracts.*

Green Extracts.—The process by which these are prepared (see *Extract. belladonnæ* in the pharmacopœia) secures the separation of albumen, which is apt to induce decomposition, and the preservation of the green colouring matter, which greatly improves the appearance of the preparation.

Aqueous Extracts.—These are prepared by infusion or

decoction from dry vegetable substances, the active principles of which are soluble in water. The extract of gentian is an example of this kind of extract and is made from an infusion, the water of which is evaporated by heat until the residuum is of the proper consistence.

Alcoholic Extracts.—This form of extract, of which the *Extractum cannabis indicæ* is an example, is made from dry vegetable drugs, the active principles of which are insoluble in water but soluble in spirit. The process is as follows. A tincture is first made, then the greater portion of the spirit is recovered from this by distillation, and, lastly, what remains is reduced to the proper consistence by the heat of a water-bath.

Etherial Extracts.—In some instances the active principles of drugs are not soluble in either water or spirit, and when such is the case ether may prove a suitable solvent. The *Extractum filicis liquidum* is an example of an ethereal extract. It is prepared by exhausting the fern root with ether in a percolator, and recovering the ether by distillation or evaporating it over a water-bath. In preparing *Extractum mezerei æthereum* the drug is first exhausted with spirit, and from the extract thus procured a certain portion is separated by the selective action of ether.

Acetic Extract.—The acetic extract of colchicum is the only example of this kind of preparation, and acetic acid is used as a solvent because it combines with an alkaloid, the active principle of the drug, to form an acetate.

Fluid Extracts.—These are of recent introduction, and form a most useful class of preparations. As their name indicates they are of a fluid consistence, and are therefore dispensed by measure. They are made by first exhausting the drug with water or ether, according to the nature of the active properties, and then adding sufficient spirit to prevent decomposition which would otherwise be certain to ensue.

In reducing extracts to the proper consistence evaporation is usually conducted by means of a water-bath or steam-bath, but in this country it may sometimes be effected by exposure in the open air. Great care is, however, required to exclude dust and insects.

Extracts should be kept in close jars, as otherwise they get dry and hard or mouldy.

The following are the officinal extracts :—

Extractum aconiti *Dose*, 1 *to* 2 *gr.*	=	Inspissated juice of fresh plant.
,, aloes barbadensis *Dose*, 1 *to* 3 *gr.*	=	Barbadoes aloes 1 lb. : Water 1 gal. : ·100 parts of aloes yield about 75 of extract.*
,, aloes socotrinæ *Dose*, 2 *to* 3 *gr.*	=	Socotrine aloes 1 lb.: Water 1 gal. ·100 parts of aloes yield about 50 of extract.*
,, anthemidis *Dose*, 2 *to* 10 *gr.*	=	Chamomile flowers 1 lb. : Oil of chamomile 15 min. : Water 1 gal.
,, belæ liquidum *Dose*, 1 *to* 2 *dr.*	=	Bael 1 lb. : Water 12 pints : Rectified spirit 2 oz. : = 1 oz. in oz. 1.
,, belladonnæ *Dose*, ¼ *to* 1 *gr.*	=	Inspissated juice of fresh plant.
,, calumbæ *Dose*, 2 *to* 10 *gr.*	=	Calumba 1 lb. : Water 4 pints.
,, cannabis indicæ *Dose*, ¼ *to* 1 *gr.*	=	Indian hemp in coarse powder 1 lb. : Rectified spirit 4 pints.
,, cinchonæ flavæ liquidum *Dose*, 10 *to* 30 *gr.*	=	Yellow bark in coarse powder 1 lb. : Water q. s. : Rectified spirit 1 oz.
,, colchici *Dose*, 1 *to* 3 *gr.*	=	Inspissated juice of fresh corms deprived of their coats.
,, colchici aceticum *Dose*, 1 *to* 2 *gr.*	=	Fresh corms deprived of their coats 7 lb. : Acetic acid 6 oz. : reduce to proper consistence by heat.

* Squire.

Extractum colocynthidis co.= *Dose, 2 to 5 gr.*	Colocynth free from seeds 6 oz.: Ext. of socotrine aloes 12 oz.: Scammony resin 4 oz.: Hard soap 3 oz.: Cardamoms 1 oz.: Proof spirit 1 gal.
,, conii = *Dose, 4 to 8 gr.*	Inspissated juice of fresh plant.
,, ergotæ liquidum = *Dose, 10 to 30 min.*	Ergot 1 lb.: Ether 20 oz. or q.s.: Water 70 oz.: Rect. spirit 8 oz.= 1 oz. in oz. 1.
,, filicis liquidum = *Dose, 15 to 30 min.*	Fern root 2 lb.: Ether 4 pints or q.s.
,, gentianæ = *Dose, 10 to 15 gr.*	Gentian 1 lb.: Boiling water 1 gal.
,, glycyrrhizæ = *Dose, ½ to 1 dr.*	Liquorice root 1 lb.: Water 80 oz.
,, glycyrrhizæ liquidum = *Dose, 1 dr.*	Prepare as for extract reduce to spec. gravity of 1·160 and add ⅛th vol. of Rect. spirit.
,, hæmatoxyli = *Dose, 10 to 30 gr.*	Logwood 1 lb.: Boiling water 1 gal.
,, hyoscyami = *Dose, 2 to 10 gr.*	Inspissated juice of fresh plant.
,, jalapæ = *Dose, 5 to 15 gr.*	Jalap 1 lb.: Rect. spirit 4 pts.: Water 1 gal. = About double the strength of the powder.
,, krameriæ = *Dose, 5 to 20 gr.*	Rhatany 1: Water a sufficiency.
,, lactucæ = *Dose, 5 to 15 gr.*	Inspissated juice of fresh plant.
,, lupuli = *Dose, 5 to 15 gr.*	Hop 1 lb.: Rect. spirit 30 oz.: Water 1 gal.
,, mezerei æthereum=	Mezereon bark 1 lb.: Re ct spirit 8 pts.: Ether 20 o z

Extractum nucis vomicæ *Dose*, $\frac{1}{2}$ *to* 2 *gr.*	=	Nux vomica 1 lb.: Rect. spirit a sufficiency.
,, opii *Dose*, $\frac{1}{2}$ *to* 2 *gr.*	=	Opium 1 lb.: water 6 pints. = Double the strength of opium.
,, opii liquidum *Dose*, 10 *to* 40 *min.*	=	Extract of opium 1 oz.: Water 16 oz.: Rect. spirit 4 oz. = 22 gr. of opium nearly in 1 fl. oz.
,, papaveris *Dose*, 2 *to* 5 *gr.*	=	Poppy capsules 16 oz.: Rect. spirit 2 oz.: Boiling water a sufficiency.
,, pareiræ *Dose*, 10 *to* 20 *gr.*	=	Pareira root 1 lb.: Boiling water 1 gal.
,, pareiræ liquidum *Dose*, $\frac{1}{2}$ *to* 2 *dr.*	=	Pareira root 16 oz.: Boiling water 1 gal.: Rect. spirit 3 oz. = 1 oz. in 1 oz.
,, physostigmatis *Dose*, $\frac{1}{16}$ *to* $\frac{1}{4}$ gr.	=	Calabar bean 1 lb.: Rect. spirit 4 pints.
,, quassiæ *Dose*, 3 *to* 5 *gr.*	=	Quassia 1 lb.: Boiling water a sufficiency.
,, rhei *Dose*, 5 *to* 15 *gr.*	=	Rhubarb root 1 lb.: Rect. spirit 10 oz.: Water 5 pints.
,, sarsæ liquidum *Dose*, 2 *to* 4 *dr.*	=	Sarsaparilla 16 oz.: Water 14 pts.: Rect. spirit 1 oz. = 2 oz. in 1 oz.
,, stramonii *Dose*, $\frac{1}{4}$ *to* $\frac{1}{2}$ *gr.*	=	Stramonium seeds 1 lb.: Ether 1 pint: Water and proof spirit of each a sufficiency.
,, taraxaci *Dose*, 5 *to* 30 *gr.*	=	Inspissated juice of fresh root.

86. *Glycerinum.*—The glycerine is a form of preparation, made officinal for the first time in the 2nd edition of the pharmacopæia. The chemical substance glycerine is an excellent and bland solvent of many articles but sparingly

soluble in water, and has the advantage of mixing readily with that fluid. It dissolves many of the alkaloids, such as quinia, atropia, strychnia and morphia, and forms an useful agent for suspending articles which may not be soluble either in it or in water. It is also a powerful antiseptic, and in the proportion of 1 part to 10 of distilled water* will preserve unchanged, even in colour, the flowers and leaves of plants, and animal tissues for almost any length of time. The officinal glycerines are 5 in number and as follows:—

Except in the case of *Glycerinum amyli* all the others consist of 1 part of the active ingredient and 4 parts of the solvent.

Glycerinum acidi carbolici *Dose, 5 to 10 min.*		=	Carbolic acid 1 oz.: Glycerine 4 oz.
„	acidi gallici *Dose, 10 to 40 min.*	=	Gallic acid 1 oz.: Glycerine 4 oz.
„	acidi tannici *Dose, 10 to 40 min.*	=	Tannic acid 1 oz.: Glycerine 4 oz.
„	amyli	=	Starch 1 oz.: Glycerine 8 oz.
„	boracis	=	Borax 1 oz.: Glycerine 4 oz.

87. *Infusum.*—The infusion is a watery solution of the extractive matter of a vegetable drug, got either by digesting it in hot, or macerating it in cold, water, for a given period. The form of infusion is preferred to that of decoction when the substance to be acted upon contains useful volatile principles, which would be dissipated by boiling, or when the desired principles can be extracted at a temperature below the boiling point. To render the crude drug fit for infusion it has usually to be *coarsely powdered, sliced, chipped, cut small* or *bruised.* The time during which the process of infusion has to be continued ranges from $\frac{1}{4}$th of an hour to 4 hours, according to the

* *Squire.* I have tried it with the delicate flowers of the night blowing Cereus and Dillenia speciosa, and found the former in good condition after immersion for one year, and the latter unchanged after two years. The only practical objection to the preservative is, that a fungus is apt to grow on the surface of the fluid. This might be obviated by adding some carbolic acid. (G. B.).

facility with which the substance yields its properties to water. The temperature at which the water has to be used also varies considerably. In the case of the infusions of Calumba and Quassia cold water is prescribed, as both drugs are readily acted upon by the fluid at that temperature, and as hot water would give a less elegant or more perishable preparation. All others are made with boiling water, 212° Fhr., except the infusions of chiretta and cusparia which are prepared with water at the temperature of 120° Fhr. When the process has been carried on for the prescribed time, the fluid has to be strained through a cloth, which should be perfectly clean. An infusion may be made in any stone- ware jug with a cover, but the most effective form of vessel is the pot shewn in Fig. 20 (see page 20). Although the infusion is a convenient and active form of preparation it is very perishable, and will rarely keep good for more than 24 hours in a tropical climate. It should always therefore be dispensed fresh, and in prescribing the tendency to decomposition may be partly obviated, by combining with it a due proportion of some suitable tincture. Some infusions will keep good for 2 or 3 days, if bottled while quite hot and at once corked so as to prevent all contact with the air. The infusion of senna is especially subject to decomposition but this tendency may, according to Squire, be partly overcome by adding 1 gr. of Nitre to each ounce of infusion. It will be observed that the strength of a good many of the infusions is 1 in 20. The exceptions to this rule have been marked with a (†) and these the student should carefully note.

The following is a list of the officinal infusions :—

Infusum anthemidis *Dose*, 1 *to* 4 *oz.*	= Chamomile flowers ½ oz. : Boiling water 10 oz.: Infuse 15 min.=1 oz. in 20.
„ aurantii *Dose*, 1 *to* 2 *oz.*	= Bitter orange peel ½ oz. : Boiling water 10 oz.: Infuse 15 min.=1 oz. in 20.
†„ aurantii co. *Dose*, 1 *to* 2 *oz.*	= Bitter orange peel ¼ oz. : Fresh lemon peel 60 gr. : Cloves 30 gr. : Boiling water 10 oz. : Infuse 15 min.= 1 oz. in 40.

Infusum buchu *Dose*, 1 *to* 4 *oz.*	=	Buchu leaves ½ oz.: Boiling water 10 oz.: Infuse 60 min. = 1 oz. in 20.
„ calumbæ *Dose*, 1 *to* 2 *oz.*	=	Calumba ½ oz.: Cold water 10 oz.: Infuse 60 min. = 1. oz in 20.
†„ caryophylli *Dose*, 1 *to* 4 *oz.*	=	Bruised cloves ¼ oz.: Boiling water 10 oz.: Infuse 30 min. = 1 oz. in 40.
†„ cascarillæ *Dose*, 1 *to* 2 *oz.*	=	Cascarilla 1 oz.: Boiling water 10 oz.: Infuse 60 min. = 1 oz. in 10.
†„ catechu *Dose*, 1 *to* 2 *oz.*	=	Pale catechu 160 gr.: Cinnamon 30 gr.: Boiling water 10 oz.: Infuse 30 min.
†„ chiratæ *Dose*, 1 *to* 2 *oz.*	=	Chiretta ¼ oz.: Water, at 120°; 10 oz.: Infuse 30 min. = 1 oz. in 40.
„ cinchona flavæ *Dose*, 1 *to* 2 *oz.*	=	Yellow bark ½ oz.: Boiling water 10 oz.: Infuse 2 hours. = 1 oz. in 20.
„ cuspariæ *Dose*, 1 *to* 2 *oz.*	=	Cusparia bark ½ oz.: Water, at 120°. 10 oz.: Infuse 2 hours. = 1 oz. in 20.
†„ cusso *Dose*, 4 *to* 8 *oz.*	=	Kousso ½ oz.: Boiling water 8 oz.: Infuse 15 min. = 1 oz. in 16.
†„ digitalis *Dose*, 2 *to* 4 *dr.*	=	Digitalis leaves 30 gr.: Boiling water 10 oz.: Infuse 1 hour. = 1 oz. in 160.
†„ dulcamaræ *Dose*, 1 *to* 2 *oz.*	=	Dulcamara 1 oz.: Boiling water 10 oz.: Infuse 1 hour. = 1 oz. in 10.
†„ ergotæ *Dose*, 1 *to* 2 *oz.*	=	Ergot ¼ oz.: Boiling water 10 oz.: Infuse 30 min. = 1 oz. in 40.

†	Infusum gentianæ co. *Dose*, 1 *to* 2 *oz.*	=	Gentian root and Bitter orange peel of each 60 gr.: Fresh lemon peel $\frac{1}{4}$ oz.: Boiling water 10 oz.: Infuse 1 hour.
„	krameriæ *Dose*, 1 *to* 2 *oz.*	=	Rhatany root $\frac{1}{2}$ oz.: Boiling water 10 oz.: Infuse 1 hour. = 1 oz. in 20.
†„	lini	=	Linseed 160 gr.: Fresh liquorice root 60 gr.: Boiling water 10 oz.: Infuse 4 hours.
„	lupuli *Dose*, 1 *to* 2 *oz.*	=	Hop $\frac{1}{2}$ oz.: Boiling water 10 oz.: Infuse 2 hours. = 1 oz. in 20.
„	maticæ *Dose*, 1 *to* 4 *oz.*	=	Matico leaves $\frac{1}{2}$ oz.: Boiling water 10 oz.: Infuse 30 min. = 1 oz. in 20.
†„	quassiæ *Dose*, 1 *to* 2 *oz.*	=	Quassia 60 gr.: Cold water 10 oz.: Infuse 30 min.
†„	rhei *Dose*, 1 *to* 2 *oz.*	=	Rhubarb root $\frac{1}{4}$ oz.: Boiling water 10 oz.: Infuse 1 hour. = 1 oz. in 40.
†„	rosæ acidum *Dose*, 1 *to* 2 *oz.*	=	Dried red-rose petals $\frac{1}{4}$ oz.: Diluted sulphuric acid 1 dr.: Boiling water 10 oz.: Infuse 30 min. = 1 oz. in 40.
„	senegæ *Dose*, 1 *to* 2 *oz.*	=	Senega root $\frac{1}{2}$ oz: Boiling water 10 oz.: Infuse 1 hour. = 1 oz. in 20.
†„	sennæ *Dose*, 1 *to* 2 *oz.*	=	Senna 1 oz.: Ginger 30 gr.: Boiling water 10 oz.: Infuse 1 hour. = 1 oz. in 10.
†„	serpentariæ *Dose*, 1 *to* 2 *oz.*	=	Serpentary root $\frac{1}{4}$ oz.: Boiling water 10 oz.: Infuse 2 hours. = 1 oz. in 40.

Infusum uvæ ursi *Dose*, 1 *to* 2 *oz.*	=	Bearberry leaves $\frac{1}{2}$oz.: Boiling water 10 oz.: Infuse 2 hours. = 1 oz. in 20.
†,, valerianæ *Dose*, 1 *to* 2 *oz.*	=	Valerian root 120 gr.: Boiling water 10 oz.: Infuse 1 hour. = 1 oz. in 40.

88. *Injectio.*—But one preparation of this kind is officinal viz. the hypodermic solution of morphia, but neutral sulphate of quinine and various alkaloids may also be given in this way. The quinine injection should be of the strength of 1 gr. to 12 minims of water:—

Injectio morphiæ hypodermica *Dose, hypodermically*, 1 *to* 6 *min.*	=	Hydrochlorate of morphia 88 grs.: Solution of ammonia, acetic acid and distilled water of each a sufficiency = 5 gr. in 1 fl. drachm.

89. *Linimentum.*—The liniment is a compound fluid, or semi-fluid, preparation, for external application. The word *liniment* is derived from *lino*, *I anoint*, and indicates that the substance is to be smeared on or rubbed into some part of the body. All the officinal liniments, except the Linimentum aconiti, L. belladonnæ and L. iodi, are of an oily or soapy nature. Liniments containing narcotic substances for the relief of pain, such as Liniment. opii, as well as some of those used for counter irritation, such as Liniment. crotonis, usually require to be well rubbed into the part to which they are applied. In dispensing liniments the nature of the contents of the bottle should be indicated, in a way that will preclude all risk of the medicine being taken internally. The label should therefore bear the words,

POISON

For external use only.

And should a mixture or draught be sent out along with the liniment to the same patient, the further precaution should be adopted of putting the two medicines in bottles

differing in size and shape. The officinal liniments* are as follows :—

Linimentum aconiti	=	Aconite root 20 oz. : Camphor 1 oz. : Rectified spirit enough to percolate 20 oz.
" ammoniæ	=	Solution of ammonia 1 oz. : Olive oil 3 oz.
" belladonnæ	=	Belladonna root 20 oz. : Camphor 1 oz. : Rect. spirit enough to percolate 20 oz.
" calcis	=	Solution of lime and Olive oil of each 2 oz.
" camphoræ	=	Camphor 1 oz. : Olive oil 4 oz.
" " co	=	Camphor $2\frac{1}{2}$ oz. : Oil of lavender 1 dr. : Strong solution of ammonia 5 oz. : Rect. spirit 15 oz.
" chloroformi	=	Chloroform 2 oz. : Liniment of camphor 2 oz.
" crotonis	=	Croton oil 1 oz.: Oil of cajuput and Rectified spirit of each $3\frac{1}{2}$ oz.
" hydrargyri	=	Ointment of mercury 1 oz. : Solution of ammonia and Liniment of camphor of each 1 oz.
" iodi	=	Iodine $1\frac{1}{4}$ oz. : Iodide of potassium $\frac{1}{2}$ oz. : Camphor $\frac{1}{4}$ oz. : Rectified spirit 10 oz.
" opii	=	Tincture of opium and soap liniment of each 2 oz.

* A very effective liniment for lumbago consists of equal parts of chloroform, tincture of opium, tincture of belladonna and tincture of aconite, applied over the seat of the pain on a piece of spongeopiline. Care must be taken that there is no broken skin.

Linimentum potassii iodidi cum sapone	=	Hard soap and Iodide of potassium of each $1\frac{1}{2}$ oz.: Glycerine 1 oz.: Oil of lemon 1 dr.: Water 10 oz.
,, saponis	=	Hard soap $2\frac{1}{2}$ oz.: Camphor $1\frac{1}{4}$ oz.: Oil of rosemary 3 dr.: Rect. spirit 18 oz.: Water 2 oz.
,, sinapis co.	=	Oil of mustard 1 dr.: Ethereal extract of mezereon 40 gr.: Camphor 120 gr.: Castor oil 5 dr.: Rect. spirit 4 oz.
,, terebinthinæ	=	Soft soap 2 oz.: Camphor 1 oz.: Oil of turpentine 16 oz.
,, ,, aceticum	=	Oil of turpentine, Acetic acid and Liniment of camphor, of each 1 oz.

90. *Liquor.*—This preparation is a watery solution of an alkaloid, a salt or some other active substance. Some of the more important solutions contain 4 grains of the active ingredient to the ounce, and for facility of reference these have been marked with an asterisk (*) in the annexed list. The class liquores contains a very heterogeneous collection of preparations, some being for internal and others for external use:—

Liquor ammoniæ	=	Strong solution of ammonia 1 pint: water 2 pints.
,, ammoniæ acetatis *Dose, 2 to 6 dr.*	=	Carbonate of ammonia $3\frac{1}{4}$ oz.: Acetic acid 10 oz.: Water 50 oz.
,, ammoniæ citratis *Dose, 2 to 6 dr.*	=	Citric acid 3 oz.: Strong solution of ammonia $2\frac{3}{4}$ oz.: Water 20 oz.
,, ,, fortior	=	Chloride of ammonium 3 lb.: slaked lime 4 lb.: Dist. Water 32 oz.

Liquor antimonii chloridi =	Black antimony 1 lb. boiled in hydrochloric acid 4 pints.
* ,, arsenicalis = *Dose, 2 to 8 min.*	Arsenious acid 80 gr.: Carb of potash 80 gr.: Comp. tincture of lavender 5 dr.: Water to make up 20 oz. = 1 gr. in 2 dr.
* ,, arsenici hydrochloricus = *Dose, 2 to 8 min.*	Arsenious acid 80 gr.: Hydrochlor. acid 2 dr.: Water to make up 20 oz.: = 1 gr. in 2 dr.
* ,, atropiæ =	Atropia 4 gr.: Rect. spirit 1 dr.: Water 7 dr. = 1 gr. in 2 dr.
* ,, atropiæ sulphatis =	Sulphate of atropia 4 gr.: Water 1 oz. = 1 gr. in 2 dr.
,, bismuthi et ammoniæ citrat. = *Dose, ½ to 1 dr.*	Bismuth 430 gr.; Nitric acid 2 oz.: Citric acid 2 oz.: Solution of ammonia and water of each a sufficiency.
,, calcis = *Dose, 1 to 4 oz.*	Lime 2 oz.: Water 1 gal.
,, calcis chloratæ =	Chlorinated lime 1 lb.: Water 1 gal.
,, calcis saccharatus = *Dose, 15 to 60 min.*	Lime 1 oz.: Sugar 2 oz.: Water 20 oz.
,, chlori = *Dose, 10 to 20 min.*	Hydrochlor. acid 6 oz.: Black oxide of manganese 1 oz.: Water 34 oz.
,, epispasticus =	Cantharides 8 oz.: Acetic acid 4 oz.: Ether a sufficiency to make 20 oz.
,, ferri perchloridi = *Dose, 10 to 30 min.*	Strong solution of perchloride of iron 5 oz.: Water 15 oz.

Liquor ferri perchloridi fortior =	Iron wire 2 oz.: Hydrochloric acid 12 oz.: Nitric acid 9 dr.: Water 8 oz.: makes 10 oz.
" ferri pernitratis = *Dose, 10 to 40 min.*	Fine iron wire 1 oz.: Nitric acid $4\frac{1}{2}$ oz.: Water a sufficiency: makes 30 oz.
" ferri persulphatis =	Sulphate of Iron 8 oz.: Sulphur acid and Nitric acid each 6 dr.: Water 12 oz.: makes 11 oz.
" gutta-percha =	Gutta-percha 1 oz.; Chloroform 8 oz.: carbonate of lead 1 oz.: Put the gutta-percha in 6 oz. of the chloroform and shake till dissolved. Then add the carbonate of lead and remainder of chloroform, shake several times, set the mixture aside and when the insoluble matter has subsided, decant the clear fluid and keep in a close-stoppered bottle.
" hydrargyri nitratis acidus =	Mercury 4 oz.: Nitric acid 5 oz.: Water $1\frac{1}{2}$ oz.
" " perchloridi = *Dose, $\frac{1}{2}$ to 2 dr.*	Perchloride of mercury and Choloride of ammonium, of each 10 gr.: Water 20 oz. = $\frac{1}{16}$ gr. in 1 dr.
" iodi =	Iodine 20 gr.: Iodide of potassium 30 gr.: Water 1 oz.
" lithiæ efferverscens= *Dose, 5 to 10 oz.*	Carbonate of lithia 10 gr.: Water 20 oz. Mix and charge with carbonic acid gas. = 1 gr. in 2 oz.

Liquor magnesiæ carbonatis = *Dose*, 1 *to* 2 *oz.*	Sulphate of magnesia 2 oz.: Carb. of soda $2\frac{1}{2}$ oz.: Water a sufficiency. = 13 gr. in 1 oz.
,, magnesiæ citratis = *Dose*, 5 *to* 10 *oz.*	Carbonate of magnesia 100 gr.: Citric acid 200 gr.: Syrp. of lemons $\frac{1}{2}$ oz.: Bicarb. of potash 40 gr.: Water a sufficiency.
* ,, morphiæ acetatis = *Dose*, 10 *to* 60 *min.*	Acetate of morphia 4 grs.: Dilute acetic acid 8 min: Rect. spirit 2 dr.: Water 6 dr. = 1 gr. in 2 dr.
* ,, morphiæ hydrochloratis = *Dose*, 10 *to* 60 *min.*	Hydrochlorate of morphia 4 gr.: Dilute hydrochlor acid 8 min.: Rect. spirit 2 dr.: Water 6 dr. = 1 gr. in 2 dr.
,, plumbi subacetatis =	Acetate of lead 5 oz.: Oxide of lead $3\frac{1}{2}$ oz.: Water 20 oz.
,, ,, ,, dilutus =	Solution of subacetate of lead and Rect. spirit, of each 2 dr.: Water $19\frac{1}{2}$ oz.
,, potassæ = *Dose*, 15 *to* 60 *min.*	Carbon. of potash 1 lb.: Slaked lime 12 oz.: Water 1 gal.: Dissolve carb. of potash and boil, add lime and boil for 10 minutes. Decant clear fluid.
,, potassæ effervescens = *Dose*, 5 *to* 10 *oz.*	Bicarb. of potash 30 grs.: Water 1 pint. Dissolve, filter and charge with carbonic acid gas.
* ,, ,, permanganatis = *Dose*, 2 *to* 4 *dr.*	Permanganate of potash 80 gr.: Water 1 pint. = 1 gr. in 2 dr.

Liquor sodæ *Dose, ½ to 1 dr.*	=	Carb. of soda 28 oz.: Slaked lime 12 oz.: Water 1 gal.
* „ sodæ arseniatis *Dose, 5 to 10 min.*	=	Arseniate of soda 4 gr.: Water 1 oz. = 1 gr. in 2 dr.
„ sodæ chloratæ *Dose, 10 to 20 min.*	=	Carb. of soda 12 oz.: Black oxide of manganese 4 oz.: Hydrochlor. acid 15 oz.: Water 2 pints.
„ sodæ effervescens	=	Bicarb. of soda 30 grs.: Water 1 pint. Dissolve, filter and charge with carbonic acid gas.
* „ strychniæ *Dose, 5 to 10 min.*	=	Strychnia 4 grs.: Dilute hydrochlor. acid 6 ♏.: Rect. spirit 2 dr.: Water 6 dr. = 1 gr. in 2 dr.
„ zinci chloridi	=	Granulated zinc 1 lb.: Hydrochlor. acid 44 oz.: Solut. of chlorine a sufficiency: Carb. of zinc. ½ oz.: Water 1 pint.

91. *Lotio.*—Is a fluid preparation for external use. The following are the two preparations of this kind in the Pharmacopœia.

Lotio hydrargyri flava	=	Perchlor of Mercury 18 gr. solution of lime 10 oz.
„ hydrargyri nigra	=	Subchloride of Mercury 30 gr.: Solution of lime 10 oz.

92. *Mel.*—This is a semi-fluid preparation of which Mel, *honey*, is the excipient. There are four such preparations in the pharmacopœia, viz.:—

Mel boracis	=	Borax 64 gr.: Honey 1 oz.
„ depuratum	=	Honey 5 lbs.: melt in a water bath and strain.

Oxymel	=	Honey 40 oz.: Acetic acid 5 oz.: Water 5 oz.
„ scillæ	=	Vinegar of squill 1 pint: Honey 2 lbs.

93. *Mistura.*—The mixture is a compound preparation of which water, except in the case of Mistura scammoniæ, is the excipient; and the active ingredients are either suspended or held in solution. Mistura sennæ co. is an example of a mixture in which the ingredients are in solution, and the Mistura guaiaci of one in which the chief substance is suspended in emulsion. Mixtures are of such strength as that the dose will usually be from ½ to 2 ounces, and they may be prescribed along with other suitable articles. The officinal mixtures are as follows:—

Mistura ammoniaci *Dose, ½ to 1 oz.*	=	Ammoniacum ¼ oz.: Water 8 oz.
„ amygdalæ *Dose, 1 to 2 oz.*	=	Compound powder of almonds 2½ oz.: Water 1 pint.
„ creasoti *Dose, 1 to 2 oz.*	=	Creasote and Glacial acetic acid, of each 16 min.: Spirit of Juniper ½ dr.: Syrup 1 oz.: Water 15 oz. = 1 ♏. in 1 oz. nearly.
„ cretæ *Dose, 1 to 2 oz.*	=	Prepared chalk ¼ oz.: Gum acacia ¼ oz.: Syrup ½ oz.: Cinnamon Water 7½ oz.
„ ferri aromatica *Dose, 1 to 2 oz.*	=	Pale-cinchona powder 1 oz.: Calumba powder ½ oz.: Cloves ¼ oz.: Iron wire ½ oz.: Comp. tinct. of cardamoms 3 oz.: Tincture of orange peel ½ oz.: Peppermint water a sufficiency.

Mistura ~~ammoniaci~~ Ferri co. = *Dose*, 1 *to* 2 *oz.*	Sulphate of Iron 25 gr.: Carb. of potash 30 gr.: Myrrh and Sugar, of each 60 gr.: Spirit of nutmeg 4 dr.: Rose water $9\frac{1}{2}$ oz.
„ gentianæ = *Dose*, $\frac{1}{2}$ *to* 2 *oz.*	Gentian $\frac{1}{4}$ oz.: Bitter orange peel and Coriander fruit, each 30 gr.: Proof spirit 2 oz.: Water 8 oz.
„ guaiaci = *Dose*, $\frac{1}{2}$ *to* 2 *oz.*	Guaiac. resin and sugar, each $\frac{1}{2}$ oz.: Gum acacia $\frac{1}{4}$ oz.: Water 1 pint.
„ scammonii = *Dose*, $\frac{1}{2}$ *to* 2 *oz.* ~~(*for a child*).~~	Resin of scammony 4 gr.: Milk 2 oz. = 1 gr. in $\frac{1}{2}$ oz.
„ sennæ co. = *Dose*, 1 *to* $1\frac{1}{2}$ *oz.*	Sulphate of magnesia 4 oz.: Ext. of liquorice $\frac{1}{2}$ oz.: Tinct. senna $2\frac{1}{2}$ oz.: Compd. tinct. of cardamoms 10 dr.: Infus. of senna sufficient to make one pint=1 oz. of Sulph. magnes. in 5.
„ spiritus vini gallici= *Dose*, 1 *to* 2 *oz.*	Brandy and Cinnamon water, each 4 oz.: Yolks of 2 eggs: Sugar $\frac{1}{2}$ oz.

94. *Mucilago.*—The mucilage is a watery solution of gum or starch, and is chiefly used for suspending powders in mixtures, or rendering resins or oils miscible with water. Starch mucilage forms the excipient in enemas, and is also used for stiffening the bandages in which fractured limbs are put up. The gum mucilages are sometimes employed as demulcents in cough or irritation of the bladder, and mucilage of acacia is a constituent of the lozenges of the pharmacopæia:—

Mucilago acaciæ =	Gum acacia 4 oz.: Water 6 oz.

Mucilago amyli = Starch 120 gr.: Water 10 oz.

„ tragacanthæ = Tragacanth 60 gr.: Water 10 oz.

95. Oleum.—Oils are of two kinds, *fixed* and *volatile*, the former being of a fatty nature while the latter are fragrant and fugitive. The difference between them is easily illustrated by letting a drop or two of each fall upon paper, and then heating the stains. When heated, the stain of the volatile oil gradually disappears, while that of the other remains permanent. The fixed oils are derived from both the vegetable and animal kingdoms, and are non-nitrogenous bodies. Some of them are emollient and nutrient, while others are acrid and cathartic. The vegetable fixed oils are generally got by expression from fruits or seeds, while those derived from the animal kingdom, such as Cod Liver Oil, are usually obtained by the action of heated water or of steam. The essential oils are mainly got from the leaves and flowers of plants, some such as the oils of juniper and lemon are got from fruits, and others, such as the oils of cinnamon and nutmeg, from the bark or seeds. Most of them when exposed to a low temperature yield a liquid oil or *elœopten*, and a camphor-like solid *stearopten*—*Thymol*, the new disinfecting agent, is, as already mentioned, an example of a stearopten, and curious to say has been long made by the natives of India from the *Ptychotis ajowan*, and sold under the name of *Ajwain-ka-phul*. Volatile oils are usually made by distilling the parts of the plants which yield the oils, with water. The oils during the process are carried over mechanically with the steam, and the mixture is condensed into a milky fluid which finally separates into oil and water. Most of the oils are lighter than water and float on it, but others, such as the oil of cloves, are heavier and sink. Some oils, such as that of lemon, may be got from the fresh substance by expression. Volatile oils are very frequently adulterated with fixed, but this fraud can be easily detected by heating the stain made by the oil on paper. If it is unadulterated, the spot will disappear, but if otherwise, it will remain greasy.

The following are the officinal oils :—

VOLATILE OILS.

a. Got from the fruit by distillation.

Oleum anethi ... ...*Dose*, 1 *to* 4 *min.*
,, anisi ... ... ,, 1 *to* 4 ,,
,, carui ... ... ,, 1 *to* 4 ,,
,, coriandri ... ... ,, 1 *to* 4 ,,
,, cubebæ ... ... ,, 5 *to* 20 ,,
,, juniperi ... ... ,, 1 *to* 3 ,,
,, limonis ... ... ,, 1 *to* 4 ,,
,, myristicæ ... ... ,, 2 *to* 6 ,,
,, pimentæ ... ... ,, 1 *to* 3 ,,
,, sinapis.

b. Got from the flowers by distillation.

Oleum anthemidis ... ...*Dose*, 2 *to* 4 *min.*
,, caryophylli ... ... ,, 1 *to* 4 ,,
,, lavandulæ ... ... ,, 1 *to* 4 ,,

c. Got by distillation from the leaves or fresh herb.

Oleum cajuputi ... ...*Dose*, 1 *to* 5 *min.*
,, menthæ piperitæ ... ... ,, 1 *to* 4 ,,
,, ,, viridis ... ... ,, 1 *to* 4 ,,
,, rutæ ... ... ,, 2 *to* 6 ,,
,, sabinæ ... ... ,, 1 *to* 5 ,,

d. Got by distillation from the bark.

Oleum cinnamomi ... ... *Dose*, 1 *to* 4 *min.*

e. Got by distillation from the oleo-resin.

Oleum copaibæ ... ...*Dose*, 5 *to* 20 *min.*
,, terebinthinæ ... ... ,, 10 *to* 30 ,,

f. Got from the flowering tops.

Oleum rosmarini ... ...*Dose*, 2 *to* 5 *min.*

FIXED OILS.

a. Vegetable.

Oleum amygdalæ, expressed from the seed...*Dose*, 2 *to* 4 *dr.*
,, crotonis do. *Dose*, $\frac{1}{3}$ *to* 1 *min.*
,, lini do.

Oleum myristicæ expressum, from the seed with heat.
„ ricini do. ...*Dose* ½ *to* 1 *oz.*
„ theobromæ do.
„ olivæ expressed from the ripe fruit. „ ½ *to* „

b. Animal.

Oleum Morrhuæ extracted from the fresh livers of the Cod by heat. ... *Dose*, 1 *to* 4 *dr.*

c. Compound oil.

Oleum phosphoratum, is a solution of phosphorus in almond oil, effected by agitation and gentle heat. Phosphorus 12 grs. olive oil, previously heated to 300° for 5 minutes and allowed to cool and filtered, 4 oz. They are then mixed, heated in a water bath to 180° and shaken until dissolved. ... *Dose*, 5 *to* 10 *min.*

90. *Pilula.*—The Pill is a form of medicine containing solids that are active in small doses. It should be of a round form, of such consistence as to retain its shape, from 4 to 5 grains in weight and about the size of a pea. If larger than this it will be difficult to swallow it whole. In one instance, the cholera pills used in India, directions are given to break them up before giving them to the patient. This is done to secure their prompt action, because these pills being sent out in anticipation of an epidemic are generally so old and hard before they are used, that if not powdered, they would be apt to pass through the patient entire. But even when fresh the powdering of these is desirable, as the ingredients then act more speedily. To prevent pills from adhering to each other, as well as to conceal their taste and keep their ingredients in good condition, they should be rolled in magnesia, liquorice powder or starch, or coated with gold leaf, white of egg, ethereal solution of tolu or gelatine. In the case of pills containing calomel, magnesia should not be used for rolling them in, as decomposition is apt to ensue. The pill when given to a patient will, of course, take longer to act than a fluid preparation or even a powder, as it must be dissolved in the alimentary canal before its ingredients can have any effect. In some cases pills which are intended to operate on the lower bowels, such as aloes, are made up with alcohol and coated with ethereal solution of tolu, to prevent

solution until they reach the seat of action. The kinds of substances suited for the pilular form are as follows :—

1. Substances which act in small doses.

2. Substances which, from their offensive taste or smell or insolubility, cannot be given in the fluid form.

3. When the ingredients are not intended to act too rapidly.

4. Vegetable powders, mineral substances, resins, balsams, gum-resins, extracts and essential oils.

The kinds of substances unsuited for the pilular form are :—

1. Those which only act in large doses.

2. Articles of a volatile or deliquescent nature, or which would undergo rapid change in the mass.

3. Substances which are required to act speedily, such as emetics and stimulants.

The nature and quantity of the excipient, or substance used to cause the articles of the pill mass to adhere, must depend on the nature and quantity of the active ingredients. Powders, or other dry substances, will require a moist excipient and moist articles a dry one, the quantity in each case being such as to secure the requisite adhesiveness and firmness. The moist excipients are water, soft extracts, confection of roses, honey, treacle, mucilage, alcohol, tinctures and essential oils. The dry excipients are aromatic or inert powders, dry extracts, soap and bread crumb. The following is a list of officinal pills :—

Pilula aloes barbadensis *Dose*, 5 *to* 10 *gr.*	=	Barbad. aloes 2 oz. : Hard soap 1 oz. : Oil of Caraway 1 dr. : Confection of roses 1 oz.
,, aloes et assafœtidæ *Dose*, 5 *to* 10 *gr.*	=	Socotrine aloes, Assafœtida, Hard soap, Confection of roses, of each 1 oz.
,, aloes et ferri *Dose*, 5 *to* 10 *gr.*	=	Sulphate of iron $1\frac{1}{2}$ oz. : Barbad. aloes 2 oz. : Compound powder of cinnamon 3 oz. : Confection of roses 4 oz.

Pilula aloes et myrrhæ *Dose*, 5 *to* 10 *gr.*	=	Socotrine aloes 2 oz.: Myrrh 1 oz.: Saffron $\frac{1}{2}$ oz.: Confection of roses $2\frac{1}{2}$ oz.
,, aloes socotrinæ *Dose*, 5 *to* 10 *gr.*	=	Socotrine aloes 2 oz.: Hard soap 1 oz.: Volatile oil of nutmeg 1 dr.: Confection of roses 1 oz.
,, assafœtidæ co. *Dose*, 5 *to* 10 *gr.*	=	Assafœtida, Galbanum, Myrrh, of each 2 oz.: Treacle, by weight, 1 oz.
,, cambogiæ co. *Dose* 5 *to* 10 *gr.*	=	Gamboge, Barbad. aloes, Compound powder of cinnamon, of each 1 oz.: Hard soap 2 oz.: Syrup a sufficiency.
,, colocynthidis co. *Dose*, 5 *to* 10 *gr.*	=	Colocynth 1 oz.: Barbad. aloes, Scammony, in powder, of each 2 oz.: Sulpht. of potash $\frac{1}{4}$ oz.: Oil of cloves 2 dr.: Water a sufficiency.
,, colocynth. et hyoscyami ,, *Dose*, 5 *to* 10 *gr.*	=	Compound colocynth pill 2 oz.: Extract of hyoscyamus 1 oz.
,, conii co. *Dose*, 5 *to* 10 *gr.*	=	Extract of hemlock $2\frac{1}{2}$ oz.: Ipecacuanha $\frac{1}{2}$ oz.: Treacle a sufficiency.
,, ferri carbonatis *Dose*, 5 *to* 20 *gr.*	=	Saccharated carbonate of iron 1 oz.: Confection of roses $\frac{1}{4}$ oz.
,, ferri iodidi *Dose*, 3 *to* 8 *gr.*	=	Fine iron wire 40 gr.: Iodine 80 gr.: Sugar 70 gr.: Liquorice powder 140 gr.: Water 50 minims.
,, hydrargyri *Dose*, 3 *to* 8 *gr.*	=	Mercury 2 oz.: Confection of roses 3 oz.: Liquorice powder 1 oz.

Pilula hydrg. subchloridi co. *Dose*, 5 *to* 10 *gr.*	=	Subchloride of Mercury, Sulphurated antimony, of each 1 oz.: Guaiacum resin 2 oz.: Castor oil 1 oz.
„ ipecacuanhæ cum scilla *Dose*, 5 *to* 10 *gr.*	=	Compd. powder of ipecac. 3 oz.: Squill, Ammoniacum, in powder, of each 1 oz.: Treacle a sufficiency. = About 3 gr. of Dover's powder in 6 gr.
Pilula phosphori *Dose*, 3 *to* 6 *gr.*	=	Phosphorus 2 grs.: Balsam of tolu 120 grs.: Yellow wax 60 gr. = about $\frac{1}{18}$ gr. in 5 grs.
„ plumbi cum opio *Dose*, 2 *to* 10 *gr.*	=	Acetate of lead 36 grs.: Opium 6 gr.: Confection of roses 6 gr. = 6 gr. of Acetate of lead and 1 gr. Opium in 8 grs.
„ quiniæ *Dose*, 2 *to* 10 *gr.*	=	Sulphate of quinia 60 gr.: confection of Hips 20 gr. = 3 grs. in 4.
„ rhei co. *Dose*, 5 *to* 10 *gr.*	=	Rhubarb powder 3 oz.: Socot. aloes $2\frac{1}{4}$ oz.: Myrrh, Hard soap, in powder, of each $1\frac{1}{2}$ oz.: Oil of peppermint $1\frac{1}{2}$ dr.: Treacle, by weight, 4 oz.
„ saponis co. *Dose*, 3 *to* 5 *gr.*	=	Opium $\frac{1}{2}$ oz.: Hard soap 2 oz.: Water a sufficiency. = 1 gr. opium in 6 nearly.
„ scammonii co. *Dose*, 5 *to* 15 *gr.*	=	Resin of scammony, Resin of jalap, Curd soap, in powder, of each 1 oz.: strong Tincture of ginger 1 oz.: Rect. spirit 2 oz.

Pilula scillæ co. = Squill $1\frac{1}{4}$ oz.: Ginger 1 oz.: Ammoniacum 1 oz.: Hard soap 1 oz.: Treacle by weight 2 oz.
Dose, 5 to 10 gr.

97. *Pulvis.*—A powder consists of one or more vegetable or mineral substances, in a fine state of division. The more minutely a powder is divided the more prompt and energetic will be its action; and some medicines, such as Jalap and Camphor, induce disagreeable effects when given to a patient in a coarse state of division. In making up compound powders the ingredients should be thoroughly mixed, as otherwise they will fail to produce the desired action and may even prove dangerous. The form of powder is adopted when a drug is not suited for administration in pill, mixture or confection, but sometimes it has the disadvantage of being bulky or offensive to the palate, or of containing much inert matter. Powders administered in successive large doses and not very active in character, such as Magnesia, may accumulate in the intestinal canal; and to prevent this a laxative should occasionally be given to the patient. As it would be difficult and disagreeble to swallow a large quantity of a dry powder, it is generally given in the form of a draught in water, with the addition of some aromatic tincture and mucilage or syrup. Powder of Cinchona may be given in water, but Magnesia and Compound rhubarb powder do not readily mix with this fluid, and should therefore be first moistened with some tincture, or in the case of a child with a little syrup, and the water added afterwards. Jalap and Compound jalap powder may be treated in the same manner. Ipecacuan powder is best administered by first moistening it with Aromatic spirit of ammonia, and then adding sufficient water to make a draught. Dover's powder is always a nauseous dose, but is rendered much less so by being mixed, at the time of administration, with some Syrup of ginger. Calomel and Hydrargyrum cum creta may be given in plain syrup, or in a little mucilage and water. Jellies are common domestic vehicles for giving powders, and are admirably suited for the purpose:—

Pulvis amygdalæ co. = Almonds 8 oz.: Sugar 4 oz.: Gum acacia 1 oz.

Pulvis antimonialis *Dose*, 3 *to* 10 *gr.*	=	Oxide of antimony 1 oz.: Phosphate of lime 2 oz.
„ catechu co. *Dose*, 20 *to* 40 *gr.*	=	Catechu 4 oz.: Kino, Rhatany, in powder, of each 2 oz.: Cinnamon, Nutmeg, in powder, of each 1 oz.
„ cinnamomi co. *Dose*, 3 *to* 10 *gr.*	=	Cinnamon powder, Cardamom seeds, Ginger, in powder, of each 1 oz.
„ cretæ aromaticus *Dose*, 10 *to* 60 *gr.*	=	Cinnamon powder 4 oz.: Nutmeg, Saffron, in powder, of each 3 oz.: Clove powder $1\frac{1}{2}$ oz.: Cardamom seeds powder 1 oz.: Sugar 25 oz.: Prepared chalk 11 oz.
„ cretæ aromaticus cum opio *Dose*, 10 *to* 40 *gr.*	=	Aromatic powder of chalk $9\frac{3}{4}$ oz.: Opium powder $\frac{1}{4}$ oz. = 1 gr.: of opium in 40 gr.
„ elaterii compositus *Dose*, $\frac{1}{2}$ *to* 5 *gr.*	=	Elaterium 10 gr.: Sugar of milk 90 gr.
„ glycyrrhizæ compositus *Dose*, 30 *to* 60 *gr.*	=	Senna, Liquorice root, in powder, of each 2 oz.: Refined sugar 6 oz.
„ ipecacuanhæ co. *Dose*, 5 *to* 15 *grs.*	=	Ipecacuan powder $\frac{1}{2}$ oz.: Opium powder $\frac{1}{2}$ oz.: Sulphate of potash 4 oz.: = 1 gr. of opium and 1 of ipecac. in 10 gr.
„ jalapæ co. *Dose*, 20 *to* 60 *grs.*	=	Jalap powder 5 oz.: Acid tartrate of potash 9 oz.: Ginger powder 1 oz.
„ kino co. *Dose*, 5 *to* 20 *gr.*	=	Kino $3\frac{3}{4}$: Opium powder $\frac{1}{4}$ oz.: Cinnamon powder 1 oz. = 1 gr. of Opium in 20.

Pulvis opii co. *Dose, 2 to 5 gr.*	=	Opium powder $1\frac{1}{2}$ oz.: Pepper powder 2 oz.: Ginger powder 5 oz.: Caraway powder 6 oz.: Tragacanth powder $\frac{1}{2}$ oz. = 1 gr. in 10 gr.
,, rhei co. *Dose, 20 to 60 gr.*	=	Rhubarb powder 2 oz.: Light magnesia 6 oz.: Ginger powder 1 oz.
,, scammonii co. *Dose, 10 to 20 gr.*	=	Scammony powder 4 oz.: Jalap powder 3 oz.: Ginger powder 1 oz.
,, tragacanthæ co. *Dose, 20 to 60 gr.*	=	Tragacanth, Gum acacia, Starch, in powder, of each 1 oz.: Sugar 3 oz.

98. *Sapo.*—Soaps are preparations which result from double decomposition, when fats and oils are brought into contact with salifiable bases. There are 3 officinal soaps, two of which are hard and 1 soft, and all 3 are soluble in rectified spirit. Soaps form ingredients in pills, plasters, suppositories and liniments.

Sapo animalis	=	Soda and a purified animal fat consisting chiefly of stearine.
,, durus	=	Soda and olive oil.
,, mollis	=	Potash and olive oil.

99. *Spiritus.*—The spirits of the pharmacopœia are chiefly solutions of essential oils in rectified spirit, and may be regarded as strong tinctures. The following are however distilled products:—

Spiritus ætheris nitrosi.	Spiritus armoraciæ co.
,, ammoniæ aromaticus.	,, rectificatus.
,, ,, fœtidus.	,, vini gallici.

Spirits made with essential oils are of uniform strength, and contain 1 part of the oil in 50 of *spiritus*. The spirit of nitrous ether is not properly speaking a spirit, the alcohol used in its preparation being mostly converted into

nitrous ether. The spirit is a very convenient form of preparation being miscible with water in any proportion, and the spirits of the pharmacopœia are as follows :—

Spiritus ætheris = *Dose, 30 to 90 min.*	Ether 10 oz.: Rectified spirit 1 pint.
„ ætheris nitrosi = *Dose, ½ to 2 dr.*	Nitric acid 3 oz.: Sulphuric acid 2 oz.: Fine copper wire 2 oz.: Rectified spirit q. s.: by distillation.
„ ammoniæ aromaticus = *Dose, ½ to 1 dr.*	Carbonate of ammonia 8 oz.: Strong solution of ammonia 4 oz.: Volatile oil of nutmeg 4 dr.: Oil of lemon 6 dr.: Rectified spirit 6 pints: Water 3 pints: by distillation.
„ ammoniæ fœtidus = *Dose, ½ to 1 dr.*	Assafœtida 1½ oz.: Strong solution of ammonia 2 oz.: Rectified spirit q. s.: by distillation.
„ armoraciæ co. = *Dose, 1 to 2 dr.*	Horseradish scraped, Bitter orange peel cut small and bruised, of each 20 oz.: Nutmeg bruised ½ oz.: Proof spirit 1 gal.: water 2 pints: by distillation.
„ cajuputi = *Dose, ½ to 1 dr.*	Oil of Cajuput 1 oz.: Rectified spirit 49 oz.
„ camphoræ = *Dose, 10 to 30 min.*	Camphor 1 oz.: Rectified spirit 9 oz.
„ chloroformi = *Dose, 20 to 60 min.*	Chloroform 1 oz.: Rectified spirit 19 oz.
„ juniperi = *Dose, ½ to 1 dr.*	Oil of Juniper 1 oz.: Rectified spirit 49 oz.
„ lavandulæ = *Dose, ½ to 1 dr.*	Oil of lavender 1 oz.: Rectified spirit 49 oz.

Spiritus menthæ piperitæ *Dose, ½ to 1 dr.*	=	Oil of peppermint 1 oz.: Rectified spirit 49 oz.
,, myristicæ *Dose, ½ to 1 dr.*	=	Oil of nutmeg 1 oz.: Rectified spirit 49 oz.
,, rectificatus	=	Alcohol with 16 per cent. of water: by distillation.
,, rosmarini *Dose,* 10 *to* 30 *min.*	=	Oil of rosemary 1 oz.: Rect. spirit 49 oz.
,, tenuior	=	Rectified spirit 5 pints: Distilled water 3 pints.
,, vini Gallici	=	Brandy, spirit distilled from French wine.

100. *Succus.*—The succi are the juices expressed from fresh medicinal plants, and preserved by the addition of a due proportion of spirit. This form of preparation was first proposed by Mr. Squire in 1835, who says regarding it, "it was thought that by thus avoiding the action of air, "which leaves (for tincture) are subjected to whilst drying, "or the action of both air and heat as when extracts are "prepared, the properties of the plant would be preserved "unimpaired." It must, however, be remarked that the strength of the juices of plants varies somewhat, according to the nature of the season and the kind of soil in which the plant has grown. The officinal succi are 5 in number:—

Succus belladonnæ *Dose,* 5 *to* 15 *min.*	=	Juice of 7 lb. of fresh belladonna leaves: and 1 measure Rect. spirit to every 3 measures of juice.
,, conii *Dose, ½ to 1 dr.*	=	Juice of 7 lb. of fresh hemlock leaves: and 1 measure Rectified spirit to every 3 measures of juice.
,, hyoscyami *Dose, ½ to 1 dr.*	=	Juice of 7 lb. of fresh henbane leaves: and 1 measure Rect. spirit to every 3 measures of juice.

Succus scoparii *Dose*, 1 *to* 2 *dr.*	=	Juice of 7 lb. of fresh broom tops : and 1 measure Rectified spirit to every 3 measures of juice.
,, taraxaci *Dose*, 1 *to* 2 *dr.*	=	Juice of 7 lb. of fresh dandelion root : and 1 measure Rectified spirit to every 3 measures of juice.

101. *Suppositoria.*—The suppository is a mass of a conical shape, of such size and consistence as will permit of its being inserted into the rectum. The excipients of the mass are articles that will melt at the natural temperature of the body and liberate the active ingredients, so that they may act on the lower part of the intestine or, by absorption, on the system generally. In four of the seven officinal suppositories, the excipient is a compound of benzoated lard, white wax and oil of theobroma. This combination is somewhat soft for use in India, and requires the addition of a little more wax than the proportion given in the pharmacopœia. The medicated pessary is made exactly in the same manner as the suppository, but is introduced into the vagina instead of the rectum:—

Suppositoria acidi carbolici cum sapone	=	Carbolic acid 12 gr. : Curd soap 180 gr. : Starch a sufficiency : makes 12.
,, ,, tannici	=	Tannic acid 36 gr. : Benzoated lard 44 gr.: White wax 10 gr.: Oil of theobroma 90 gr. : makes 12.
,, ,, ,, cum sapone	=	Tannic acid 36 gr. : Glycerine of starch 50 gr.: Curd soap 100 gr. : Starch a sufficiency : makes 12.

Suppositoria hydrargyri	=	Ointment of Mercury 60 gr.: Benzoated lard, White wax, of each 20 gr.: Oil of theobroma 80 gr.: makes 12.
,, morphiæ	=	Hydrochlorate of morphia 6 gr.: Benzoated lard 64 gr.: White wax 20 gr.: Oil of theobroma 90 gr.: makes 12.
,, ,, cum sapone	=	Hydrochlorate of morphia 6 gr.: Glycerine of starch 50 gr.: Curd soap 100: Starch a sufficiency: makes 12.
,, plumbi co.	=	Acetate of lead 36 gr.: Opium in powder 12 gr.: Benzoated lard 42 gr.: White wax 10 gr.: Oil of theobroma 80 gr.: makes 12.

102. *Syrupus.*—The syrup is a preparation in which a strong solution of sugar is the vehicle for some flavouring or remedial agent, and is a very common form in French pharmacy. The advantages of a syrup are its pleasant taste, its power of suspending articles not readily miscible with water, and its property of preventing decomposition in some drugs, as the iodide of iron in the syrupus ferri iodidi. The proportion of sugar in a syrup is a matter of great importance, as when there is too much the sugar is apt to crystallise, and when there is too little, the preparation is liable to ferment or become mouldy. In some cases, as that of the syrup of red poppy, spirit has to be added to prevent decomposition. The syrups of orange and of ginger also contain spirit, being made from the tinctures which give very clear and well flavoured preparations. If the sugar with which a syrup is to be made be impure, it should previously be clarified by white of egg. The egg should be beaten to a froth and stirred into the hot syrup, when it will rise to the surface in a clot enclosing the impurities, which should be scummed off. If a syrup

be not perfectly clear it may be purified, when partially cooled, by filtration through folds of flannel. Syrups should be kept in stoppered bottles of moderate size, and in a cool place:—

Syrupus	=	Refined sugar 5 lbs.: Water 2 pints: add water to make $7\frac{1}{2}$ lbs. by weight.
,, aurantii *Dose*, 1 *dr.*	=	Tinct. of orange peel 1 oz.: Syrup 7 oz.
,, aurantii floris *Dose*, 1 *dr.*	=	Orange flower water 8 oz.: Refined sugar 3 lbs.: Water 16 oz.
,, chloral *Dose*, $\frac{1}{2}$ *to* 2 *dr.*	=	Hydrate of chloral 80 gr.: Dist.-water 4 dr.: Syrup to make one ounce. = 10 gr. in 1 dr.
,, ferri iodidi *Dose*, $\frac{1}{2}$ *to* 1 *dr.*	=	Fine iron wire 1 oz.: Iodine 2 oz.: Refined sugar 28 oz.: Distilled water 13 oz. = 4·3 gr. ferri iodidum in 1 dr.
,, ferri phosphatis *Dose*, 1 *dr.*	=	Granulated sulphate of iron 224 gr.: Phosphate of soda 200 gr.: Acetate of soda 74 gr.: Dilute phosphoric acid $5\frac{1}{2}$ oz.: Sugar 8 oz.: Water 8 oz. = 1 gr. ferri phosphas in 1 dr.
,, hemidesmi *Dose*, 1 *dr.*	=	Hemidesmus root 4 oz.: Sugar 28 oz.: Boiling water 20.
,, limonis *Dose*, 1 *dr.*	=	Fresh lemon peel 2 oz.: Lemon juice strained 20 oz.: Sugar 36 oz.
,, mori *Dose*, 1 *dr.*	=	Mulberry juice 20 oz.: Sugar 32 oz.: Rectified spirit $2\frac{1}{2}$ oz.

Syrupus papaveris *Dose*, 1 *dr*.	= Dry poppy capsules, free from seeds, in coarse powder 36 oz.: Rectified spirit 16 oz.: Sugar 4 lbs.: Boiling water q. s.
,, rhamni *Dose*, 1 *dr*.	= Buckthorn juice 4 pints: Ginger sliced and pimento bruised, of each $\frac{3}{4}$ oz.: Sugar 5 lbs.: Rectified spirit 6 oz.
,, rhei *Dose*, 1 *to* 4 *dr*.	= Rhubarb, Coriander, in coarse powder of each 2 oz.: Sugar 24 oz.: Rectified spirit 8 oz.: Water 24 oz.
,, rhœados *Dose*, 1 *dr*.	= Fresh red poppy petals 13 oz.: Sugar 36 oz.: Water 20 oz.: Rectified spirit $2\frac{1}{2}$ oz.
,, rosæ gallicæ *Dose*, 1 *dr*.	= Dried red rose petals 2 oz.: Sugar 30 oz.: Boiling water 20 oz.
,, scillæ *Dose*, $\frac{1}{2}$ *to* 1 *dr*.	= Vinegar of squill 1 pint: Sugar $2\frac{1}{2}$ lb.
,, sennæ *Dose*, 1 *to* 4 *dr*.	= Senna broken small 16 oz.: Oil of coriander 3 min.: Sugar 24 oz.: Distilled water 100 oz.: Rectified spirit 2 oz.
,, tolutanus *Dose*, 1 *dr*.	= Balsam of tolu $1\frac{1}{4}$ oz.: Sugar 32 oz.: Distilled water 20 oz.
,, zingiberis *Dose*, 1 *dr*.	= Strong tincture of ginger 6 dr.: Syrup 19 oz.

103. *Tinctura.*—The tincture is a fluid preparation, of which the active ingredients are usually held in solution by spirit. In one instance spirit of ether is employed, and in two others spirit of ammonia is used, as a solvent. For leaves, herbs and many roots proof spirit is the usual men-

struum, but when the active constituent of a drug is of a resinous or oily nature rectified spirit has to be used. When tinctures made with rectified spirit are added to water the mixture, owing to the separation of the active ingredients, is apt to assume a milky appearance, and to keep these suspended a little mucilage should be added before pouring in the tincture. Proof spirit is the ordinary solvent for making tinctures, and is used when the active principles of the substances to be acted on are partly soluble in water, and partly in spirit. Aromatic spirit of ammonia is employed when the ingredients to be dissolved are of an oily or resinous nature, and also with the view of adding to the tincture the medicinal virtues of ammonia. The two tinctures made with it are the Ammoniated tincture of guaiacum and the Ammoniated tincture of valerian, but it is also one of the ingredients in the Ammoniated tincture of opium and Ammoniated tincture of quinine. The Spirit of ether is only employed in the preparation of the Etherial tincture of lobelia, and is used with the view of increasing the medicinal efficacy of the preparation. Some tinctures are prepared by maceration, some by percolation, some by both these processes combined, and some by simply dissolving a solid in, or mixing a fluid with, the menstruum :—

EXAMPLES.

By maceration.	Tinctura opii.
By percolation.	Tinctura zingiberis fortior.
By maceration & percolation.	Tinctura digitalis.
By dissolving a fluid in the menstruum.	Tinctura chloroformi co.
By dissolving a solid in do.	Tinctura quiniæ.

The strength of many of the tinctures is 1 oz. in 8 oz. The exceptions to this rule, in the following list, have been marked with an asterisk for easy reference :—

Tinctura aconiti *Dose*, 5 *to* 15 *min.*	=	Aconite root in coarse powder $2\frac{1}{2}$ oz.: Rectified spirit 20 oz.
*,, aloes *Dose*, 1 *to* 2 *dr.*	=	Socotrine aloes in coarse powder $\frac{1}{2}$ oz.: Extract of liquorice $1\frac{1}{2}$ oz.: Proof spirit q. s. to make 1 pint.

* Tinctura arnicæ *Dose, 1 to 2 dr.*	=	Arnica root in coarse powder 1 oz. : Rectified spirit 20 oz.
,, assafœtida *Dose, ½ to 1 dr.*	=	Assafœtida in small fragments 2½ oz. : Rect. spirit q. s. to make 1 pint.
*,, aurantii *Dose, 1 to 2 dr.*	=	Bitter orange peel cut small and bruised 2 oz. : Proof spirit 20 oz.
*,, aurantii recentis *Dose, 1 to 2 dr.*	=	Fresh orange peel 6 oz. : Rectified spirit 20 oz.
*,, belladonnæ *Dose, 5 to 20 min.*	=	Belladonna leaves in coarse powder 1 oz. : Proof spirit 20 oz. = 1 oz. in 20 oz.
*,, benzoini co. *Dose, ½ to 1 dr.*	=	Benzoin in coarse powder 2 oz. : Storax 1½ oz. : Bals. of tolu ½ oz. : Socotrine aloes 160 gr. : Rect. spirit 20 oz.
,, buchu *Dose, 1 to 2 dr.*	=	Buchu in coarse powder 2½ oz. : Proof spirit 20 oz.
,, calumbæ *Dose, ½ to 2 dr.*	=	Calumba cut small 2½ oz. : Proof spirit 20 oz.
*,, camphoræ co. *Dose, 15 ♏ to 1 dr.*	=	Opium in coarse powder 40 gr. : Benzoic acid 40 gr. : Camphor 30 gr. : Oil of Anise ½ dr. : Proof spirit 20 oz. = 1 gr. of Opium in ½ oz.
*,, cannabis indicæ *Dose, 5 to 20 min.*	=	Extract of cannabis 1 oz. : Rectified spirit 20 oz. = 1 oz. in 20 oz.
*,, cantharidis *Dose, 5 to 20 min.*	=	Cantharides in coarse powder ¼ oz. : Proof spirit 20 oz. = 1 part in 80.
*,, capsici *Dose, 10 to 20 min.*	=	Capsicum ¾ oz. : Rect. spirit 20 oz.

* Tinctura cardamomi co. *Dose, ½ to 2 dr.*	=	Cardamom seeds bruised ¼ oz.: Caraway bruised ¼ oz.: Raisins freed from seeds 2 oz.: Cinnamon bruised ½ oz.: Cochineal powder 60 gr.: Proof spirit 20 oz.
,, cascarillæ *Dose, ½ to 2 dr.*	=	Cascarilla bruised 2½ oz.: Proof spirit 20 oz.
*,, castorei *Dose, ½ to 2 dr.*	=	Castor in coarse powder 1 oz.: Rectified spirit 20 oz.
,, catechu *Dose, ½ to 2 dr.*	=	Pale catechu in coarse powder 2½ oz.: Cinnamon bruised 1 oz.: Proof spirit 20 oz.
,, chiratæ *Dose, ½ to 2 dr.*	=	Chiretta 2½ oz.: Proof spirit 20 oz.
*,, chloroformi co. *Dose, 20 to 60 min.*	=	Chloroform 2 oz.: Rectified spirit 8 oz.: Compound tincture of cardamoms 10 oz. = 1 oz. in 10 oz.
*,, cinchonæ co. *Dose, ½ to 2 dr.*	=	Pale bark in moderately fine powder 2 oz.: Bitter orange peel cut small and bruised 1 oz.: Serpentary bruised ½ oz.: Saffron 60 gr.: Cochineal 30 gr.: Proof spirit 20 oz.
*,, cinchonæ flavæ *Dose, ½ to 2 dr.*	=	Yellow bark in moderately fine powder 4 oz.: Proof spirit 20 oz.
,, cinnamomi *Dose, ½ to 2 dr.*	=	Cinnamon in coarse powder 2½ oz.: Proof spirit 20 oz.
,, cocci	=	Cochineal in powder 2½ oz.: Proof spirit 20 oz.
,, colchici seminum *Dose, 10 to 30 min.*	=	Colchicum seeds bruised 2½ oz.: Proof spirit 20 oz.

Tinctura conii *Dose, 20 to 60 min.*	=	Hemlock fruit bruised 2½ oz.: Proof spirit 20 oz.
*,, croci	=	Saffron 1 oz.: Proof spirit 20 oz.
,, cubebæ *Dose, ½ to 2 dr.*	=	Cubebs in powder 2½ oz.: Rectified spirit 20 oz.
,, digitalis *Dose, 10 to 30 min.*	=	Digitalis in coarse powder 2½ oz.: Proof spirit 20 oz.
*,, ergotæ *Dose, 10 ♏ to 1 dr.*	=	Ergot in coarse powder 5 oz.: Proof spirit 20 oz. = 1 oz. in 4 oz.
*,, ferri acetatis *Dose, 5 to 30 min.*	=	Solution of persulphate of iron 2½ oz.: Acetate of potash 2 oz.: Rectified spirit to make 1 pint.
*,, ferri perchloridi *Dose, 10 to 30 min.*	=	Strong solution of perchloridi of iron 5 oz.: Rectified spirit 15 oz.
,, gallæ *Dose, ½ to 2 dr.*	=	Galls 2½ oz.: Proof spirit 20 oz.
*,, gentianæ co. *Dose, ½ to 2 dr.*	=	Gentian root cut small and bruised 1½ oz.: Bitter orange peel do. ¾ oz.: Cardamom seeds bruised ¼ oz.: Proof spirit 20 oz.
*,, guaiaci ammoniata *Dose, ½ to 1 dr.*	=	Resin of guaiacum in powder 4 oz.: Aromatic spirit of ammonia enough to make 1 pint.
*,, hyoscyami *Dose, ½ to 1 dr.*	=	Hyoscyamus in coarse powder 2½ oz.: Proof spirit 20 oz.
*,, iodi *Dose, 5 to 20 min.*	=	Iodine ½ oz.: Iodide of potassium ¼ oz.: Rectified spirit 20 oz. = ½ oz. in 20 oz.

Tinctura jalapæ *Dose, ½ to 2 dr.*	=	Jalap in coarse powder 2½ oz.: Proof spirit 20 oz.
*,, kino *Dose, ½ to 2 dr.*	=	Kino 2 oz.: Rectified spirit 20 oz.
,, krameriæ	=	Rhatany in coarse powder 2½ oz.: Proof spirit 20 oz.
,, laricis *Dose, 20 to 30 min.*	=	Larch bark 2½ oz.: Rect. spirit 1 pint.
*,, lavandulæ co. *Dose, ½ to 2 dr.*	=	Oil of lavender 1½ dr.: Oil of rosemary 10 min.: Cinnamon bruised, Nutmeg bruised, of each 150 gr.: Red sandal-wood 300 gr.: Rectified spirit 40 oz.
,, limonis *Dose, ½ to 2 dr.*	=	Fresh lemon peel, sliced thin, 2½ oz.: Proof spirit 20 oz.
,, lobeliæ *Dose, ¼ to ½ dr.*	=	Lobelia in coarse powder 2½ oz.: Proof spirit 20 oz.
,, lobeliæ ætherea *Dose, ¼ to ½ dr.*	=	Lobelia in coarse powder 2½ oz.: Spirit of ether 20 oz.
,, lupuli *Dose, ½ to 2 dr.*	=	Hop 2½ oz.: Proof spirit 20 oz.
,, myrrhæ *Dose, ½ to 1 dr.*	=	Myrrh in coarse powder 2½ oz.: Rectified spirit 20 oz.
*,, nucis vomicæ *Dose, 10 to 20 min.*	=	Nux vomica 2 oz.: Rectified spirit 20 oz. = 1 oz. in 10 oz.
*,, opii *Dose, 5 to 40 min.*	=	Opium in coarse powder 1½ oz.: Proof spirit 20 oz. = 33 gr. to 1 oz. nearly, or 1 gr. in about 14½ min.

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* Tinctura opii ammoniata *Dose*, $\frac{1}{2}$ *to* 1 *dr.*	=	Opium in coarse powder 100 gr.: Saffron cut small, Benzoic acid, of each 180 gr.: Oil of anise 1 dr.: Strong solution of ammonia 4 oz.: Rectified spirit 16 oz. = 5 gr. opium to 1 oz. or 1 gr. to 96 min.
*,, pyrethri	=	Pellitory in coarse powder 4 oz.: Rectified spirit 20 oz.
*,, quassiæ *Dose*, $\frac{1}{2}$ *to* 2 *dr.*	=	Quassia in chips $\frac{3}{4}$ oz.: Proof spirit 20 oz.
*,, quiniæ *Dose*, $\frac{1}{2}$ *to* 2 *dr.*	=	Sulphate of quinine 160 gr.: Tincture of orange peel 20 oz.: = 1 gr. in 1 dr.
*,, quiniæ ammoniata *Dose*, $\frac{1}{2}$ *to* 2 *dr.*		Sulphate of quinia 160 gr.: Solut. of ammonia $2\frac{1}{2}$ oz.: Proof spirit $17\frac{1}{2}$ oz. = 1 gr. in 1 dr.
*,, rhei *Dose*, 1 *to* 2 *dr. as a stomachic* 4 *to* 8 *dr. as a purgative.*	=	Rhubarb in coarse powder 2 oz.: Saffron, Cardamoms and Coriander bruised, of each $\frac{1}{4}$ oz.: Proof spirit 20 oz.
,, sabinæ *Dose*, 20 ♏ *to* 1 *dr.*	=	Dried savin tops bruised $2\frac{1}{2}$ oz.: Proof spirit 20 oz.
,, scillæ *Dose*, 10 *to* 30 *min.*	=	Squill bruised $2\frac{1}{2}$ oz.: Proof spirit 20 oz.
,, senegæ *Dose*, 1 *to* 2 *dr.*	=	Senega in coarse powder $2\frac{1}{2}$ oz.: Proof spirit 20 oz.
,, sennæ *Dose*, $\frac{1}{8}$ *to* $\frac{1}{2}$ oz.	=	Senna broken small $2\frac{1}{2}$ oz.: Raisins freed from seeds 2 oz.: Caraway and Coriander bruised, of each $\frac{1}{2}$ oz.: Proof spirit 20 oz.
,, serpentariæ *Dose*, $\frac{1}{2}$ *to* 2 *dr.*	=	Serpentary in coarse powder $2\frac{1}{2}$ oz.: Proof spirit 20 oz.

Tinctura stramonii = *Dose*, 10 *to* 30 *min.*	Stramonium seeds bruised $2\frac{1}{2}$ oz.: Proof spirit 20 oz.
„ sumbul = *Dose*, 10 *to* 30 *min.*	Sumbul in coarse powder $2\frac{1}{2}$ oz.: Proof spirit 20 oz.
„ tolutana = *Dose*, 20 *to* 40 *min.*	Balsam of tolu $2\frac{1}{2}$ oz.: Rectified spirit 20 oz.
„ valerianæ = *Dose*, 1 *to* 2 *dr.*	Valerian in coarse powder $2\frac{1}{2}$ oz.: Proof spirit 20 oz.
„ valerianæ ammoniata = *Dose*, $\frac{1}{2}$ *to* 1 *dr.*	Valerian in powder $2\frac{1}{2}$ oz.: Aromatic spirit of ammonia 20 oz.
*„ veratri viridis = *Dose*, 5 *to* 20 *min.*	Green hellebore root in coarse powder 4 oz.: Rectified spirit 20 oz.
„ zingiberis = *Dose*, 15 *min. to* 1 *dr.*	Ginger, in coarse powder $2\frac{1}{2}$ oz.: Rectified spirit 20 oz.
*„ zingiberis fortior = *Dose*, 5 *to* 20 *min.*	Ginger, in fine powder 10 oz.: Rectified spirit 20 oz.

104. *Trochisci.*—The lozenge is a dry brittle preparation, of an oval or round form, containing some active ingredients, and with sugar and gum as excipients. It is a very eligible form for administering various remedies, more especially in the case of children, and some of the non-officinal lozenges, such as the santonine, might with advantage find a place in the pharmacopæia. The officinal lozenges are in number ten, and as follows :—

Trochisci acidi tannici = *Dose*, 1 *to* 6.	Tannic acid 360 gr.: Tincture of tolu $\frac{1}{2}$ oz.: Sugar powder 25 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage 2 oz.: Water 1 oz. Divide into 720. = $\frac{1}{2}$ gr. in each lozenge.

Trochisci bismuthi *Dose*, 1 *to* 6.	=	Subnit. of bismuth 1440 grs.: Carbonate of magnesia 4 oz.: Precipitated carbonate of lime 6 oz.: Sugar 29 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage 2 oz.: Rose Water q. s. Divide into 720. = 2 gr. in each lozenge.
,, catechu *Dose*, 1 *to* 6.	=	Catechu powder 720 gr.: Sugar powder 25 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage 2 oz.: Water q. s. Divide into 720. = 1 gr. in each lozenge.
,, ferri redacti *Dose*, 1 *to* 6.	=	Reduced iron 720 gr.: Sugar powder 25 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage 2 oz.: Water 1 oz. or q. s. Divide into 720. = 1 gr. in each lozenge.
,, ipecacuanhæ *Dose*, 1 *to* 3.	=	Ipecac. powder 180 gr.: Sugar powder 25 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage 2 oz.: Water 1 oz. or q.s. Divide into 720. = $\frac{1}{4}$ gr. in each lozenge.
,, morphiæ *Dose*, 1 *to* 6.	=	Hydrochlorate of morphia 20 gr.: Tincture of tolu $\frac{1}{2}$ oz.: Sugar powder 24 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage q. s. Water $\frac{1}{2}$ oz. Divide into 720. = $\frac{1}{36}$ gr. in each lozenge.

Trochisci morphiæ et ipecacuanhæ = *Dose*, 1 *to* 6.	Hydrochlorate of Morphia 20 gr.: Ipecac. powder 60 gr.: Tincture of tolu $\frac{1}{2}$ oz.: Sugar powder 24 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage q. s. Water $\frac{1}{2}$ oz.: Divide into 720. = $\frac{1}{36}$ gr. morphia, and $\frac{1}{12}$ gr. ipecacuanha in each lozenge.
,, opii = *Dose*, 1 *to* 6.	Extract of Opium 72 gr.: Tincture of tolu $\frac{1}{2}$ oz.: Sugar powder 16 oz.: Gum acacia powder 2 oz.: Extract of liquorice 6 oz.: Water q. s. Divide into 720. = $\frac{1}{10}$ gr. extract of opium in each lozenge.
,, potassæ chloratis= *Dose*, 1 *to* 6.	Chlorate of Potash 3,600: Sugar powder 25 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage 2 oz.: Water 1 oz. or q. s. Divide into 720. = 5 gr. in each lozenge.
,, sodæ bicarbonatis= *Dose*, 1 *to* 6.	Bicarb of Soda 3,600 gr.: Sugar powder 25 oz.: Gum acacia powder 1 oz.: Gum acacia mucilage 2 oz.: Water 1 oz. Divide into 720. = 5 gr. in each lozenge.

105. *Unguentum.*—The ointment is a soft greasy preparation, of which some fat or oil forms the excipient. It is only used for external application, and should therefore be of such consistence as will permit of its being rubbed into the skin, or spread on lint for application to a sore. As a rule ointments made according to the formulæ of the British pharmacopæia are too soft for use in a trophical cli-

mate, and, accordingly, in preparing them in India the prescribed quantity of lard or oil should be diminished, and the amount of wax proportionally increased. In preparing an ointment the active ingredients, if of a solid nature, should be reduced to impalpable powder, as when coarse particles are introduced they are apt to produce irritation on application to a raw surface. In some cases the reduction may be facilitated by the addition of a few drops of spirit or of oil, and when effected the whole of the ingredients must be thoroughly and uniformly mixed. Ointments containing active poisons, such as aconitia, atropia, belladonna or veratria, should not be applied to an excoriated surface, as, by absorption, they may produce dangerous or even fatal effects. The following are the ointments of the pharmacopæia:—

Unguentum aconitiæ	=	Aconitia 8 gr.: Rectified spirit ½ dr.: Lard 1 oz.
„ antimonii tartarati	=	Tartar emetic ¼ oz.: Simple ointment 1 oz.
„ atropiæ	=	Atropia 8 gr.: Rectified spirit ½ dr.: Lard 1 oz.
„ belladonnæ	=	Extract of belladonna 80 gr.: Lard 1 oz.
„ cadmii iodidi	=	Iodide of cadmium, in fine powder, 62 gr.: Simple ointment 1 oz.
„ cantharidis	=	Cantharides and Yellow wax, of each 1 oz.: Olive oil 6 oz.
„ cetacei	=	Spermaceti 5 oz.: White wax 2 oz.: Almond oil 20 oz. or q. s.
„ creasoti	=	Creasote 1 dr.: Simple ointment 1 oz.
„ elemi	=	Elemi ¼ oz.: Simple ointment 1 oz.
„ gallæ	=	Galls in fine powder 80 gr.: Benzoated lard 1 oz.

Unguentum gallæ cum opio	=	Ointment of galls 1 oz.: Opium in powder 32 gr.
,, hydrargyri	=	Mercury, Prepared lard, of each 1 lb.: Prepared suet 1 oz.
,, ,, ammoniati	=	Ammoniated mercury 62 gr.: Simple ointment 1 oz.
,, hydrargyri co.	=	Ointment of mercury 6 oz.: Yellow wax and Olive oil of each 3 oz.: Camphor $1\frac{1}{2}$ oz.
,, hydrargyri iodidi rubri	=	Red iodide of mercury 16 gr.: Simple ointment 1 oz.
,, hydrargyri nitratis	=	Mercury by weight 4 oz.: Nitric acid 12 oz.: Lard 15 oz.: Olive oil 32 oz.
,, hydrargyri oxidi rubri	=	Red oxide, in very fine powder 62 gr.: Yellow wax $\frac{1}{4}$ oz.: Oil of almonds $\frac{3}{4}$ oz.
,, hydrargyri subchloridi	=	Calomel 80 gr.: Lard 1 oz.
,, iodi	=	Iodine, Iodide of potassium, of each 32 gr.: Proof spirit 1 dr.: Lard 2 oz.
,, picis liquidæ	=	Tar 5 oz.: Yellow wax 2 oz.
,, plumbi acetatis	=	Acetate of lead 12 gr.: Benzoated lard 1 oz.
,, plumbi carbonatis	=	Carbonate of lead, in fine powder, 62 gr.: Simple ointment 1 oz.

Unguentum plumbi iodidi =	Iodide of lead, in fine powder, 62 gr. : Simple ointment 1 oz.
,, plumbi subacetatis co. =	Solution of subacetate of lead 6 oz. : Camphor 60 gr. : White wax 8 oz. : Oil of almonds 20 oz.
,, potassæ sulphuratæ =	Sulphurated potash 30 gr. : Lard 1 oz.
,, potassii iodidi =	Iodide of potassium 64 gr. : Carbonate of potash 4 gr. : Water 1 dr. : Lard 1 oz.
,, resinæ =	Resin in coarse powder 8 oz. : Yellow wax 4 oz. : Simple ointment 16 oz.
,, sabinæ =	Fresh savin tops, bruised, 8 oz. : Yellow wax 3 oz. : Lard 16 oz.
,, simplex =	White wax 2 oz. : Lard 3 oz. : Almond oil 3 oz.
,, sulphuris =	Sublimed sulphur 1 oz. : Benzoated lard 4 oz.
,, sulphuris iodidi =	Iodide of sulphur 30 gr. : Lard 1 oz.
,, terebinthinæ =	Oil of turpentine 1 oz. : Resin in coarse powder 60 gr. : Yellow wax and prepared lard, of each, $\frac{1}{2}$ oz.
,, veratriæ =	Veratria 8 gr. : Lard 1 oz. : Olive oil $\frac{1}{2}$ dr.
,, zinci =	Oxide of zinc 80 gr. : Benzoated lard 1 oz.

106. *Vapor.*—The vapour is a form of medicine intended for inhalation, and acts chiefly on the trachea and bronchial tubes. It is an extemporaneous preparation, and in administering it the substance which is to be converted into vapour is mixed with water, and placed in an apparatus called an *Inhaler*. If the active ingredient be volatile at the ordinary temperature of the air, as in the case of Hydrocyanic acid, cold water is employed, but if a higher temperature be necessary to convert it into vapour, as in the case of Creasote, hot water forms the vehicle. In one instance, the Vapor coniæ, a third agent, viz., potash is used, the alkali by its chemical action setting free the anodyne principle of the drug. Although *Chloroform* is not included amongst the officinal vapours, it is more frequently used for inhalation than any other volatile medicine. The easiest, and perhaps the safest, method of administering chloroform is to pour a measured quantity of it on a handkerchief folded in the shape of a cone, and to hold this, not too closely at first, over the mouth and nostrils of the patient. Before sprinkling the chloroform in the apex of the cone this portion of the cloth should be moistened with water, so as to prevent waste of the drug. The average dose to be put on the handkerchief at first is from 1 to 2 dr., and should this quantity not have much effect in the course of a minute or two, another drachm should be poured on quickly and the cone be re-applied immediately. During the administration of chloroform the patient should be kept in the recumbent position, and perfect silence be maintained in the room. Care must also be taken to dilute the chloroform vapour sufficiently with air, which is effected by not bringing the cone too closely down on the mouth and nose at first. Chloroform should never be given immediately after the patient has taken a full meal, as when the stomach is full vomiting is apt to ensue. The time usually occupied in getting a patient fully under the influence of this agent ranges from four to eight minutes; and the best test of his being in a state that will render him insensible to the pain of a capital surgical operation is the loss of sensibility in the conjunctiva, so that the eyelid can be raised and the eye itself touched without causing winking. During administration a finger must be kept on the pulse, and if it falls below 65 the handkerchief should be withdrawn, and the patient allowed to breathe

air freely until the pulse rises again to about the normal standard. If the breathing becomes stertorous, which it never does until the patient is fully narcotised, the inhalation should at once be stopped. If there be further signs of danger, such as paleness of face, dilatation of pupils and blue lips and the pulse is still sinking, cold water should be dashed on the head and chest, the tongue be pulled forward, artificial respiration kept up, and the accession of abundance of fresh air secured by fanning and by opening all the doors and windows of the room. Of late years *Ether*, either alone or mixed with Chloroform, has begun to take the place of chloroform. For the administration of ether a special inhaler is desirable, and it requires to be given in larger quantities and for a longer time than chloroform. Its effects also pass off much sooner, and as it is highly inflammable, it is somewhat dangerous to use it by candle light. On the other hand it is regarded safer as an anæsthetic, its use being rarely attended by the risks or fatal accidents which accompany the employment of chloroform. It may be given as an anæsthetic alone or mixed with an equal quantity of chloroform, or with 2 parts of chloroform, 1 of alcohol and 3 of ether. *Nitrite of amyl* is also inhaled, in doses of from 2 to 5 minims, to relieve angina pectoris, asthma, sea sickness, epilepsy, &c. When the ordinary form of *Inhaler* for administering the officinal vapours is not at hand, a very efficient apparatus for the purpose may be made as follows. Take a 10 or 12 oz. wide-mouthed bottle, and 2 pieces of glass tube each 8 to 10 inches long. Then bore two holes in the cork of the bottle and in one of these insert one of the pieces of tube, in such manner as that when the cork is put in the mouth of the bottle, the lower end of the tube will reach to within half an inch of the bottom of the bottle. Next take the other bit of tube and, with the flame of a spirit lamp, bend it at an angle, a little short of a right angle, at a point 3 inches from one end. Then pass the shorter limb of the bent tube through the second hole in the cork, and apply melted sealing wax all over the upper surface of the cork and especially round the tubes, so as to render the whole air tight. Lastly, place any of the officinal vapours in the bottle, insert the cork firmly and instruct the patient to inhale by applying his lips to the end of the bent tube :—

Vapor acidi hydrocyanici =	Dilute hydrocyanic acid 10 to 15 min.: Water (cold) 1 dr.
„ chlori =	Chlorinated lime 2 oz.: Water (cold) q. s.
„ coniæ =	Extract of hemlock 60 gr.: Solution of potash 1 dr.: Water 10 dr.
„ creasoti =	Creasote 12 min.: Boiling water 8 oz.
„ iodi =	Tincture of iodine 1 dr.: Water 1 oz.: Warm.

107. *Vinum.*—The wine is a preparation of which the active ingredients are dissolved in sherry, or, as in Vinum ferri citratis and Vinum quiniæ, in orange wine. This form is analagous to the tincture, and to render it permanent the menstruum must contain about 17 or 18 per cent. of alcohol :—

Vinum aloes = *Dose, 1 to 2 dr.*	Socotrine aloes $1\frac{1}{2}$ oz.: Cardamom seeds bruised, Ginger in coarse powder, of each 80 gr.: Sherry 2 pints.
„ antimoniale = *Dose, 5 ♏ to 1 dr.*	Tartarated antimony 40 gr.: Sherry 20 oz. = 1 gr. in $\frac{1}{2}$ oz.
„ aurantii =	Wine, made in Britain, by fermenting some saccharine solution to which the fresh peel of bitter orange has been added.
„ colchici = *Dose, 10 to 30 min.*	Colchicum corm, sliced, dried, and bruised 4 oz.: Sherry 20 oz.
„ ferri = *Dose, 1 to 4 dr.*	Fine iron wire (about No. 35) 1 oz.: Sherry 20 oz.

Vinum ferri citratis *Dose, 1 to 4 dr.*	=	Citrate of iron and ammonia 160 gr.: Orange Wine 20 oz.
,, ipecacuanhæ *Dose, 5 to 40 min.* ,, *3 to 6 dr. emetic.*	=	Ipecacuan bruised 1 oz.: Sherry 20 oz. = 1 in 20.
,, opii *Dose, 10 to 40 min.*	=	Extract of opium 1 oz.: Cinnamon bruised, Cloves bruised, of each 75 gr.: Sherry 20 oz. = about 1 gr. of extract of opium in 22 minims, or nearly 22 gr. of extract per ounce.
,, quiniæ *Dose, ½ to 1 oz.*	=	Sulphate of quinine 20 gr.: Citric acid 30 gr.: Orange wine 20 oz. = 1 gr. in 1 oz.
,, rhei *Dose, 1 to 2 dr.*	=	Rhubarb in powder $1\frac{1}{2}$ oz.: Canella bark in powder 60 gr.: Sherry 20 oz. = 1 in $13\frac{1}{3}$.
,, Xericum	=	Sherry, containing from 17 to 18 per cent. of alcohol.

108. Although the following agencies are not properly speaking pharmaceutical preparations, still it has been considered that a few notes regarding them will not be found altogether out of place here, and that they may prove useful to the student.

BATHS.

Cold Bath.—The temperature for this bath is from 50 to 75 Fhr., but it is seldom in this country that water can be procured so cold, unless artificially cooled by the addition of ice or by exposure in porous earthen pots to a current of air. The cold bath may be applied by simple affusion, or by lying down in a sufficient quantity of water in a convenient vessel. The morning, except in debilitated

subjects, is the best time for the cold bath, but it should never be taken while the body is in profuse perspiration or immediately after a full meal. It must be used with great caution in the case of persons recovering from severe illness, and in all cases the stay in it should be brief. It proves beneficial by the shock it gives to the nervous system, by the refrigeration it produces, and by the reaction or glow that follows its administration. It should never be continued so long as to cause shivering and blueness of the lips, and if it produces these effects after brief immersion, it should be discontinued. It is inadmissible in chronic inflammation, congestion or induration of the internal organs, more especially those of the abdomen, and during the menstrual period. It is also injurious in most skin diseases, great general debility and in persons having a tendency to active hæmorrhage or apoplexy. In India it is often unsafe for European adults reduced by the effects of climate, and for feeble European children. During pregnancy it may do harm, especially if there be a tendency to abortion. The cold bath has been used with much benefit in fevers when the temperature runs high, but the efficacy of its continued use in specific fevers is doubtful. When, however, the temperature runs up to 106° or 108°, as in a case of rheumatism or fever, the cold bath will often save the patient's life.

109. *Shower Bath.*—The effects of this are similar to those of the cold bath, but the shock is much more severe, especially if the water descends from a considerable height. The shower bath apparatus consists of a cistern supported at a height of from 8 to 10 feet on pillars, which are surrounded with curtains so as to screen the person of the bather. In the bottom of the cistern there is a depression having below a piece of tin perforated with small holes, and above a valve which can be raised by the bather pulling a string. The cistern is filled with cold water, which, when the valve is opened, descends through the perforated tin in a dense shower. The cautions given with reference to the cold bath should be even more strictly observed in prescribing the shower bath. In appropriate cases it is a most useful agent, in improper it may do much harm.

110. *Douche Bath.*—In the douche bath a stream of cold water descending from a height through a tube is directed

on some part of the body, usually the head or back. It is a very powerful agent and should be used with the greatest caution. It is often employed with much benefit in acute mania, and as a topical application in chronic affections of the joints. The shock, or impression made on the nerves is great and often causes prolonged depression. Cold affusion is a modification of the douche and is of great service in sunstroke, and in rousing a patient suffering from a poisonous dose of alcohol or opium. In such cases the water should be poured from a good height on the head.

111. *Cold Sponging and the Wet Sheet.*—In sponging with cold water we have a remedy which is often of the greatest value, not only on account of its tonic effect, but also from the shock which it gives. It is useful in anæmia, amenorrhœa, dyspepsia, &c. It is also said to be of much value in the treatment of laryngismus stridulus, and, with certain precautions, in chorea and rickets. In using it in the two last named diseases the water should at first be tepid, and the temperature gradually reduced. Cold or tepid sponging is also often useful in febrile complaints, and most grateful to the patient. Packing in a wet sheet is also a very efficacious mode of treatment, and largely used in "water cure" establishments. When about to pack a patient in the wet sheet the bed may be prepared as follows:—Lay over the mattress two blankets. Then lay over them a sheet which has been soaked in cold water and thoroughly wrung out. The patient should then lie down on the sheet, with his head on a pillow and his arms by his sides. The wet sheet and two blankets are then to be folded tightly over the patient, first from the one side and then from the other, and to be turned up at the feet so as to completely envelope the body. Great care should be taken that the coverings are well tucked in about the neck, and over the packing two or more dry blankets may finally be placed to promote perspiration. The patient may be kept in the pack for from 30 to 50 minutes, or even an hour, and then have his body rubbed dry with towels. This treatment has a wonderful effect in reducing the pulse and temperature, and is often of great value in bringing out the rash in eruptive fevers. It is also valuable in some acute inflammatory diseases, rheumatism and specific fevers.

112. *Warm Bath and Hot Bath.*—The temperature of the water used in the former should be from 92° to 96°, and of that used in the latter from 98° to 112° Fhr. These baths act as sedatives on the nervous system, and reduce the frequency and force of the heart's action. At the same time they excite the superficial circulation, and cause a determination of blood to the surface thereby relieving internal congestion. Such results are more especially induced by the hot bath, which has also a powerful influence on the exhalent action of the skin promoting sensible and insensible perspiration, and thus proving a most valuable therapeutic agent in many diseases. These baths also equalise the general temperature of the body, and the hot bath has a powerful influence in relaxing the muscles as well as all external tissues. Hot baths are contra-indicated in fever when the pulse is excited and the skin dry and hot, in apoplectic subjects, in plethora and in hæmorrhage.

113. *Hot air Bath.*—A hot air bath may be administered by causing the patient to sit on a close bottomed chair, enveloping his body, from the neck downwards, in a water proof sheet or a blanket, and placing a spirit lamp, with a large wick and strong flame, on the floor below the chair. The confined air soon gets heated, and the skin thus stimulated rapidly becomes bathed in perspiration. It has none of the sedative influence of the hot water bath, but is rather stimulant in its primary effects. It is a powerful derivative towards the skin, and therefore often of great service in renal disease, congestive fevers, diabetes and rheumatism. It may be converted into a miniature form of Turkish bath, by pouring cold water over the patient when he has perspired freely. This addition must, however, be used with caution.

114. *The Vapour Bath.*—A vapour bath may be administered by seating the patient on a chair and enveloping his body in a blanket, as in the case of the hot air bath. The vapour may be generated by placing a basin filled with hot water under the chair, and plunging into it hot bricks or stones; or by an appropriate apparatus in which water is vaporised from a flat shallow metal saucer, by the heat of a spirit lamp. The effects of this form of bath are very similar to those of the hot water bath, but less sedative and

more derivative towards the skin. Sometimes the watery vapour is medicated by the addition of the vapours of such volatile substances as iodine, sulphur or calomel. Medicated vapour may be produced by the apparatus just mentioned, which has a special contrivance for the purpose, or by generating steam with hot bricks in the manner already described, and volatilising the medicinal agent by putting a sufficient quantity of it on a piece of mica or metal laid on a hot brick. The medicated vapour bath is a most valuable agent in the treatment of various skin diseases, and when a mercurial preparation is employed it will, by absorption, produce the constitutional effects of the drug. Hence mercurial vapour baths are frequently used in the treatment of syphilitic affections, and this mode of introducing the drug into the system has the advantage of not being so liable to cause irritation of the intestinal canal as when mercury is administered by mouth; and the degree of ptyalism induced by the vapour is milder and more manageable, than that induced by the ordinary plan of administration.

115. *Medicated Water Bath.*—This is a bath of water, warm or cold, containing some special medicinal agent, such as the Nitro-hydrochloric acid bath which is prepared by adding 8 ounces of the dilute acid to every gallon of water, and is frequently used in chronic diseases of the liver. The nitro-hydrochloric acid bath should be administered in a wooden vessel, and the water, be at the temperature of the warm bath. It is not usual to immerse the whole body in the bath but simply the legs, the rest of the body being at the same time sponged with the acidulated water. Another way of using the nitro-hydrochloric acid solution is to have a double flannel bandage 10 or 12 inches wide, and long enough to pass round the abdomen, and a piece of oiled silk slightly larger. The bandage is then dipped in the bath, wrung out, put round the abdomen and covered with the oiled silk. The flannel should be wetted morning and evening, and constantly worn. The other more common medicated baths are the Sulphurated bath, made by adding 4 ounces of sulphurated potash to 30 gallons of tepid water in a wooden vessel; and the Ioduretted bath, prepared by adding iodine in the proportion of 1 or 1½ drachms to 60 gallons of water in a

wooden vessel. Both these baths are chiefly used in the treatment of inveterate skin diseases.

116. *The Turkish Bath.*—The Turkish bath requires special and expensive erections for its administration, and is essentially a hot air bath. The bather, having divested himself of clothing, first enters a room filled with air heated to the temperature of from 110° to 165° Fhr., and containing a certain amount of moisture but not enough to repress transpiration by the skin. After a short stay there profuse perspiration ensues, and the skin gets thoroughly softened. From this the bather proceeds to another chamber, where he is freely rubbed with rough towels or flesh brushes while the perspiration lasts, so as to remove all the softened cuticle which comes away in surprising quantity. After this process the body of the bather is washed down with warm water and soap, and passing into a third room he is dried and swathed in warm dry towels. After a little rest in this state he is conducted to the cool chamber, where he reclines on a couch in a state of great comfort smoking or sipping coffee. The Turkish bath is of much value in cleaning and restoring the functions of the skin, but it requires to be used with caution, being fraught with imminent danger to individuals subject to congestion of important internal organs. At first the person should not stay in the hot chamber more than 20 minutes, and should not expose himself to a temperature over 140° Fhr. The bath should be taken before a meal, when the stomach is empty. This bath is found useful in rheumatism, gout, chronic skin-diseases, bronchitis and Bright's disease, and to invalids returned from a tropical to a temperate climate.

CHAPTER IV.

Pharmaceutical Materia Medica, &c.

117. Pharmaceutical Materia Medica treats of the physical characteristics, the chemical properties, the active principles and the means of estimating the quality of drugs, so as to distinguish the genuine from the spurious, the pure from the adulterated, and the inferior from an article of proper quality.

It is also essential that the student should acquire some knowledge of the actions and doses of medicines and of the modes of administering them, and be acquainted with the pharmaceutical principles by which the physician is guided, in drawing up a prescription. This chapter will therefore embrace the following topics :—

1*st.*—Characters, source, active principles, actions and doses of medicines.

2*nd.*—Terms used to denote the actions of medicines, and the classification of drugs according to their therapeutical effects.

3*rd.*—Modes by which medicines are introduced into the system.

4*th.*—The Prescription.

1st.—CHARACTERS, &c., OF MEDICINES.

Drugs are derived from the mineral, vegetable and animal kingdoms, and the various officinal articles will be arranged under the heads of,

1.—*Inorganic Materia Medica,*
2.—*Vegetable Materia Medica,*
3.—*Animal Materia Medica,*
4.—*Products of Fermentation, &c.*

N. B.—The composition and doses of the officinal preparations having been given in Chap. III. they will not be repeated.

I.—INORGANIC MATERIA MEDICA.

NON-METALLIC BODIES.

OXYGEN. O 16.

118. *Characters.*—A colourless gas, without taste or smell. Forms $\frac{1}{5}$th of atmospheric air by volume, and $\frac{8}{9}$ of water by weight, and combines with many of the elementary bodies to form compounds called *Oxides*. It is a most important constituent of air, being essential for the support of vegetable and animal life. *Ozone*, so called on account of its peculiar smell, may be prepared by passing the electric spark through dry oxygen or atmospheric air. It exists in the air and is a powerful disinfectant and deodoriser. It is also said to be destructive to malaria, and capable of arresting the progress of cholera.

NITROGEN. N. 14.

119. *Characters.*—This is also called azote, and is a colourless gas forming four-fifths of the atmosphere. It does not sustain combustion or respiration. It is a constituent of various articles of food, and as such is necessary for the due sustenance of the animal frame.

NITROGEN PROTOXIDE (N_2O.)

Nitrous oxide or *Laughing gas*. Is made by boiling nitrate of ammonia in a retort. The gas and steam are then passed through water and collected in a gasometer.

Action.—When inhaled this gas causes temporary delirium and incites the person to dancing, fighting, singing, &c., according to the natural temperament. It is also a valuable anæsthetic, and is much used by dentists for producing insensibility during operations on the teeth. Its effects are brief, lasting only for about 30 seconds, and there is less risk attending its use in minor operations than is the case with chloroform.

ACIDUM NITRICUM.

Nitric Acid.

Syn. Tam.—*Potluppu-diravakam.* Tel.—*Surakara-dravakam.* Duk.—*Shore-ka-tezab.* Beng.—*Shorar-tejab.**

Contains 70 p. c. of HNO_3 or 60 p. c. of anhydrous acid N_2O_5.

* In giving the Vernacular names of articles, the following abbreviations will be used :—

Tam. = *Tamil* ; Tel. = *Telugu* ; Hind. = *Hindustani* ; Duk. = *Dukhni* ; Beng. = *Bengali* ; Can. = *Canarese* ; San. = *Sanscrit.*

Characters and Tests.—A colourless liquid, having a specific gravity of 1·42. When exposed to the air it emits an acrid, corrosive vapour. If it be poured over copper filings, dense red vapours are immediately formed, but if the acid be mixed with an equal volume of water, and then added to the copper, it gives off a colourless gas, which acquires an orange red colour as it mixes with the air, and which, if it be introduced into a solution of sulphate of iron, communicates to it a dark purple or brown colour. The boiling point of the acid is 250°. If submitted to distillation the product continues uniform throughout the process. It leaves no residue when evaporated to dryness. Diluted with six times its volume of distilled water it gives no precipitate with chloride of barium or nitrate of silver. Ninety grains by weight of it mixed with half an ounce of distilled water require for neutralisation, 1,000 grain-measures of the volumetric solution of soda.

Action.—A corrosive poison, for which the antidotes are alkaline carbonates, magnesia and milk. Sometimes used externally as a caustic for warts, sloughing sores, &c.; never administered internally.

Incompatibles.—Alkalies, oxides, carbonates, alcohol.

ACIDUM NITRICUM DILUTUM.

Diluted Nitric Acid.

Characters and Tests.—Colourless. Specific gravity, 1·101. 361·3 grains by weight (6 fluid drachms) require for neutralisation 1,000 grain measures of the volumetric solution of soda, corresponding to 14·95 per cent. of anhydrous nitric acid. Six fluid drachms therefore correspond to 54 grains of the anhydrous acid (half an equivalent of N_2O_5).

Action.—An excellent tonic which may be prescribed with bitter infusions, also alterative and refrigerant: used in secondary syphilis, chronic diseases of the liver, phosphatic calculus, diarrhœa, fevers, &c.

Dose.—10 to 30 minims.

ACIDUM NITRO-HYDROCHLORICUM DILUTUM.

Diluted Nitro-Hydrochloric Acid.

Characters and Tests.—Colourless specific gravity, 1·074. 352·1 grains by weight (6 fluid drachms) require for neutralization 920 grain-measures of the volumetric solution of soda.

Action.—Alterative, tonic and refrigerant; often of much service in chronic affections of the liver, in which it may be given internally and applied locally by means of a

flannel bandage covered with oiled silk externally. The proper strength for external use is about 8 oz. of diluted acid to one gallon of water.

Dose, 5 to 20 minims.

HYDROGEN. H. 1.

120. *Characters.*—Hydrogen exists as an invisible gas, without taste or smell, and is the lightest body known. It burns with a yellow flame, and by uniting with the oxygen of the air forms water.

AQUA.

Water.

Syn.—*Dak.* Pani; *Tam.* Tanni; *Tel.* Nillu; *Can.* Niru.

The Pharmacopœia prescribes the use of natural water, the purest that can be got, cleared, if necessary, by filtration.

Tests.—Free from odour, taste and visible impurity.

The water available in India is of three kinds, viz., *well-water* from springs, *tank-water* collected during rain and containing various impurities and *river-water.* Well-water is often contaminated by the infiltration of sewage, while tank-water is generally muddy and contains organic and inorganic impurities, the kind and amount of which depend on the sanitary state and nature of the gathering grounds. The water of tanks situated within towns or villages cannot fail to contain sewage and filth of various sorts, and is often rendered still more impure by people bathing in it, and from the washing in it of clothing and even cattle. River-water is usually more or less muddy, and not infrequently contaminated by sewage. The purest water available should be employed in the dispensary, and ought to be filtered before use.

AQUA DESTILLATA.

H_2O.

Distilled Water.

Tests.—A fluid ounce of it evaporated in a clean glass capsule leaves scarcely a visible residue. It is not affected by sulphuretted hydrogen, oxalate of ammonia, nitrate of silver, chloride of barium, or solution of lime.

Action and Uses.—Water exists in the gaseous, fluid and solid states, and is one of the most powerful and generally

diffused agents in the laboratory of nature, and indispensable for the maintenance of animal and vegetable life. As a vapour there is always less or more of it present in the atmosphere, generally invisible, but sometimes manifesting its presence as a mist or fog, or by its precipitation as dew. Its most familiar form is that of a fluid in which state it descends as rain to fertilise the earth, and to perform other innumerable offices. In the colder parts of the world it falls from the clouds in minute crystals known as snow, or by intense cold is converted into a solid mass called ice. Water is an article of diet, and as a medicinal agent it is diluent. As a bath it cleans the skin and has other therapeutic effects, according to the temperature at which it is employed. Distilled water is required for some pharmaceutical and most chemical processes.

SULPHUR. S. 32.

121. Syn.—*Hin.* Gandhak ; *Dak.* Gandak ; *Tam.* Gandakam ; *Tel.* Gandhakam ; *Can.* Gandhaka ; *Sans.* Gandhaka ; *Beng.* Gandrok.

Sulphur is an opaque brittle solid of a yellow colour, and occurs in the animal, vegetable and mineral kingdoms. It combines with oxygen to form several compounds which are officinal. It is sometimes called brimstone and is chiefly got from volcanic countries, where it is met with in the crude native form in beds.

Sulphur Præcipitatum.

Precipitated Sulphur.

Characters and Tests.—A greyish-yellow soft powder free from grittiness, and from the smell of sulphuretted hydrogen. When heated in an open vessel, it burns with a blue flame and the evolution of sulphurous acid. Entirely volatilised by heat. Under the microscope it is seen to consist of opaque globules, without any admixture of crystalline matter. Otherwise it corresponds with sublimed sulphur.

Action.—Laxative and especially useful in piles. Cures itch by killing the insect, *acarus scabiei*, and its eggs. It is employed for this purpose in the form of ointment, which should be well rubbed in at night and removed by a warm bath and soap next morning. It is also considered alterative and is used in chronic rheumatism.

Dose.—20 to 60 grs.

Sulphur Sublimatum.

Sublimed Sulphur.

Characters and Tests.—A slightly gritty powder of a fine greenish-yellow colour, without taste and without odour, unless heated; burning in open vessels with a blue flame and the evolution of sulphurous acid. Entirely volatilised by heat; does not redden moistened litmus paper. Solution of ammonia, agitated with it, and filtered, does not on evaporation leave any residue.

Preparations.

Confectio sulphuris, 4 parts in 10 nearly.
Emplastrum Ammoniaci cum Hydrargyro.
„ Hydrargyri.
Sulphur Præcipitatum.
Unguentum Sulphuris, 1 part in 5.

Action.—The same as sulphur precipitatum, only less active.

Dose.—20 to 60 grs.

Acidum Sulphurosum.

Sulphurous Acid.

An aqueous solution of sulphurous acid gas.

Characters and Tests.—A colourless liquid with a pungent sulphurous odour. Specific gravity 1·04. It gives no precipitate, or but a very slight one, with chloride of barium, but a copious one if solution of chlorine be also added. 34·7 grains by weight of it mixed with an ounce of distilled water and a little mucilage of starch do not acquire a permanent blue colour with the volumetric solution of iodine until 1,000 grain-measures of the latter have been added. When evaporated it leaves no residue.

Action.—Deodorant and disinfectant. For disinfecting purposes it is generated by burning sulphur; and the room to be fumigated should be shut close and kept so for some hours, so as to give the fumes time to act. Dr. Dewar of Kirkaldy recommends the inhalation of the fumes as useful in catarrh, bronchitis, phthisis, &c., and says that equal parts of the acid and glycerine will stop the spread of erysipelas. He also applies it in the form of spray for the cure of diphtheria, sore throat and bronchitis. It is a good local application in favus and in tinea tonsurans.

Dose.—½ to 1 dr.

Acidum Sulphuricum.

Sulphuric Acid.

Syn.—*Hind.* Gandhak-ka-tezab; *Dak.* Gandak-ka-tezab; *Tam.* Gandaka-diravakam; *Tel.* Gendhaka-dravakam.

Characters and Tests.—A colourless liquid of oily appearance, intensely acid and corrosive. Specific gravity 1·843. It evolves much heat on the addition of water, and when thus diluted gives a copious precipitate with chloride of barium. 50·6 grains by weight, mixed with an ounce of distilled water, require for neutralisation 1,000 grain-measures of the volumetric solution of soda. Evaporated in a platinum dish it leaves little or no residue. When a solution of sulphate of iron is carefully poured over its surface, there is no purple colour developed where the two liquids unite. Diluted with six times its volume of distilled water it gives no precipitate with sulphuretted hydrogen.

Preparations containing free Sulphuric Acid.

Acidum Sulphuricum aromaticum.
" " dilutum.
Infusum Rosæ acidum.

Officinal Sulphates.

Alumen.	Ferri Sulphas granulata.
" exsiccatum.	Hydrargyri Sulphas.
Atropiæ Sulphas.	Magnesiæ "
Beberiæ "	Potassæ "
Cupri Sulphas.	Quiniæ "
Ferri Persulphatis, Liquor.	Sodæ "
" Sulphas.	Zinci "
" " exsiccata.	

Action.—A corrosive poison, for which the antidotes are demulcents, carbonate of magnesia and alkalies. It is sometimes made into a paste with charcoal and used as a caustic.

Incompatibles.—Salts of lime and lead, and alkalies and their carbonates.

Acidum Sulphuricum Aromaticum.

Aromatic Sulphuric Acid, or Elixir of Vitriol.

Tests.—Specific gravity 0·927. 304·2 grains by weight (6 fluid drachms) require for neutralisation 830 grain-measures of the volumetric solution of soda, corresponding to 10·91 per cent. of anhydrous sulphuric acid. Six fluid drachms therefore correspond to 33·2 grains of anhydrous acid.

Action.—An elegant and agreeable form in which to give the acid, which is tonic, astringent and refrigerant.

Dose.—5 to 30 minims diluted with water.

Acidum Sulphuricum Dilutum.

Diluted Sulphuric Acid.

Tests.—Specific gravity 1·094. 359 grains by weight (6 fluid drachms) of it require for neutralisation 1,000 grain-measures of the volumetric solution of soda, corresponding to 10·14 per cent. of anhydrous sulphuric acid. Six fluid drachms therefore correspond to 40 grains of the anhydrous acid (half an equivalent of SO_3).

Preparation in which Diluted Sulphuric Acid is used.

Infusum Rosæ acidum. 1 fluid drachm in 10 fluid ounces.

Action.—An excellent tonic and astringent, but must be well diluted. It promotes digestion as a tonic; and is a useful astringent in some forms of diarrhœa, and of hæmorrhage from the bowels, lungs or uterus. It is also given to check the night sweats of phthisis, and in poisoning from lead. The patient should imbibe the acid through a quill, as it is destructive to the teeth.

Dose.—5 to 30 minims.

Potassa Sulphurata.

Sulphurated Potash.

Synonyms.—Hepar Sulphuris. *Dubl.*
Potassii Sulphuretum, *Lond.*, *Edin.*

Characters and Tests.—Solid greenish fragments, liver-brown when recently broken, alkaline, and acrid to the taste, readily forming with water a yellow solution, which has the odour of sulphuretted hydrogen, and evolves it freely when excess of hydrochloric acid is dropped into it, sulphur being at the same time deposited. The acid fluid when boiled and filtered is precipitated yellow by perchloride of platinum, and white by chloride of barium. About three-fourths of its weight are dissolved by rectified spirit.

Preparation.—Unguentum Potassæ Sulphuratæ.

Action.—Diaphoretic, alterative, and expectorant, rarely given internally being irritant. Is used externally in various chronic skin diseases, such as scabies, psoriasis and lepra.

Dose.—3 to 8 grs.

PHOSPHORUS. P. 31.

Phosphorus.

122. A non-metallic element obtained from bones.

Characters and Tests.—A semi-transparent, colourless, wax-like solid, which emits white vapours when exposed to the air. Specific gravity 1·77. It is soft and flexible at common temperatures, melts at 110°, ignites in the air at a temperature a little above its melting point, burning with a luminous flame and producing dense white fumes. Insoluble in water, but soluble in ether and in boiling oil of turpentine.

Preparations.—Acidum Phosphoricum Dilutum, Oleum Phosphoratum, Pilula Phosphori.

Action.—An irritant poison. Workmen exposed to the fumes of phosphorus in match manufactories suffer from necrosis of the jaws, but it is said that this only happens when they have decayed teeth, or wounds of the gums through which the fumes can reach the bones. Given internally, in free doses, it produces congestion of the stomach and liver. In small doses it increases the hardness of the bones. It is useful in neuralgia, and is a powerful nervine tonic and aphrodisiac. It also stimulates the circulatory and muscular systems, but must be used with caution being apt to cause serious gastric irritation.

ACIDUM PHOSPHORICUM DILUTUM.

Diluted Phosphoric Acid.

Characters and Tests.—A colourless liquid with a sour taste and strongly acid reaction. Specific gravity, 1·08. With ammonio-nitrate of silver it gives a canary-yellow precipitate soluble in ammonia and in diluted nitric acid. Evaporated it leaves a residue which melts at a low red heat, and upon cooling exhibits a glassy appearance. It is not precipitated by sulphuretted hydrogen, chloride of barium, nitrate of silver acidulated with nitric acid, or by the solution of albumen. When mixed with an equal volume of pure sulphuric acid, and then introduced into solution of sulphate of iron, it does not communicate to it a dark colour. Mixed with an equal volume of solution of perchloride of mercury and heated, no precipitate is formed. 355 grains by weight of it poured upon 180 grains of oxide of lead in fine powder leave, by evaporation, a residue (principally phosphate of lead), which after it has been heated to dull redness weighs 215·5 grains. Six fluid drachms therefore correspond to 35·5 grains of anhydrous phosphoric acid (a quarter of an equivalent of P_2O_5).

Preparation containing free Phosphoric Acid.

Syrupus Ferri Phosphatis.

Officinal Phosphates.

Ammoniæ Phosphas.	Os Ustum.
Calcis ,,	Sodæ Phosphas.
Ferri ,,	

Action.—An excellent tonic and also refrigerant: used with good effect when the urine contains phosphates, and in rickets, scrofulous diseases, impotence, &c.

Dose.—10 to 30 minims well diluted.

Incompatibles.—Carbonate of Soda, Lime water and Calcareous salts.

IODUM. I. 127.

Iodine.

123. A non-metallic element obtained principally from the ashes of sea-weeds.

Characters and Tests.—In laminar crystals, of a peculiar odour, dark colour, and metallic lustre, which, when heated, yield a beautiful violet-coloured vapour; very sparingly soluble in water, but freely dissolved by alcohol, by ether, and by a solution of iodide of potassium. The aqueous solution strikes a deep blue colour with starch. It sublimes without leaving any residue, and the portion that first comes over does not include any slender colourless prisms emitting a pungent odour. 12·7 grains dissolved in an ounce of water containing fifteen grains of iodide of potassium, require for complete discoloration 1,000 grain-measures of the volumetric solution of hyposulphite of soda.

Preparations of Iodine.

Cadmii Iodidum.	Potassii Iodidum.
Ferri ,,	Sulphuris ,,
Hydrargyri Iodidum rubrum.	Syrupus Ferri Iodidum.
,, ,, viride.	Tinctura Iodi.
Linimentum Iodi.	Unguentum Cadmii Iodidi.
,, Potassii Iodidi cum sapone.	,, Iodi.
Liquor Iodi.	,, Plumbi Iodidi.
Pilula Ferri Iodidi.	,, Sulphuris Iodidi.
	Vapor Iodi.

Action.—Externally it acts as an irritant or caustic, and stains the skin yellow. Internally it is an alterative acting chiefly on the glandular system, promoting the absorption of enlarged glands and of other morbid growths. It is of much value in the treatment of secondary syphilis, and is also used in rheumatism, affections of the spleen and liver, scrofula and many other diseases. Topically it is frequently used as a counter-irritant and resolvent. In some persons it causes headache, vertigo, coryza, derangement of the digestive organs, &c. a state called *Iodism.*

Incompatibles.—Alkaloids, Acids, Metallic salts and Ammonia.

Cadmii iodidum.

Iodide of Cadmium.

$Cd\ I_2$.

Characters and Tests.—In flat micaceous crystals, white, of a pearly lustre, which melt when heated to about 600°, forming an amber-coloured fluid. At a dull red heat violet-coloured vapours are given off. It is anhydrous and permanent in the air; freely soluble in water and in rectified spirit, and the solution reddens litmus paper. The aqueous solution gives a yellow precipitate with sulphuretted hydrogen or sulphide of ammonium, which is insoluble in excess of the latter; the solution also gives a white gelatinous precipitate with excess of solution of potash, the filtrate from which is unaffected by sulphide of ammonium. Ten grains dissolved in water and nitrate of silver added in excess give a precipitate which, when washed with water and afterwards with half an ounce of solution of ammonia, and dried, weighs 12·5 grains.

Preparation.—Unguentum Cadmii Iodidi, 1 part in 8.

Action.—Applied in the form of ointment to reduce enlarged glands, and in chronic inflammation of the joints, nodes, &c.; also used in certain skin diseases. Does not stain the skin yellow.

Ferri Iodidum.

Iodide of Iron.

Characters and Tests.—Crystalline, green with a tinge of brown, inodorous, deliquescent, almost entirely soluble in water, forming a slightly green solution which gradually deposits a rust-coloured sediment, and acquires a red colour. Its solution gives a copious blue precipitate with the red prussiate of potash. Mixed with mucilage of starch, it acquires a blue colour on the addition of a minute quantity of solution of chlorine.

Preparations containing Iodide of Iron.

Pilula Ferri Iodidi... ... 1 part in 3.
Syrupus Ferri Iodidi ... 4·3 grains in 1 fluid drachm.

Action.—Is alterative and deobstruent from the presence of iodine, and tonic and astringent from the virtue of the iron. Is given in secondary syphilis, scrofula, leucorrhœa, phthisis, chlorosis, obstinate skin diseases, &c.

Dose.—1 to 5 gr. in solution.

Incompatibles.—Alkalies, acids, lime water, vegetable astringents.

HYDRARGYRI IODIDUM RUBRUM.

Red Iodide of Mercury.

Synonym.—Hydrargyri Biniodidum, *Lond.*, and *Edinb.*

HgI_2.

Characters and Tests.—A crystalline powder of a vermilion colour, becoming yellow when gently heated over a lamp on a sheet of paper; almost insoluble in water, dissolves sparingly in alcohol, but freely in ether, or in an aqueous solution of iodide of potassium. When digested with solution of soda it assumes a reddish-brown colour, and the fluid cleared by filtration and mixed with solution of starch gives a blue precipitate on being acidulated with nitric acid. Entirely volatilised by a heat under redness.

Preparation.

Unguentum Hydrargyri Iodidi rubri ... 1 part in 8.

Action.—In small doses alterative, in large doses an irritant poison. Used internally, and externally in the form of ointment, in syphilitic diseases.

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ gr.

HYDRARGYRI IODIDUM VIRIDE.

Green Iodide of Mercury.

Synonym.—Hydrargyri Iodidum, *Lond.*

HgI.

Characters and Tests.—A dull green powder insoluble in water, which darkens in colour upon exposure to light. When it is shaken in a tube with ether nothing is dissolved. Gradually heated in a test tube, it yields a yellow sublimate, which upon friction, or after cooling, becomes red, while globules of metallic mercury are left in the bottom of the tube.

Action.—Alterative in small, irritant in large, doses; used as an ointment in various scrofulous, and syphilitic, skin diseases.

Dose.—1 to 3 gr.

Potassii iodidum.

Iodide of Potassium.

KI.

Characters and Tests.—In colourless, generally opaque, cubic crystals, readily soluble in water, and in a less degree in spirit. It commonly has a feeble alkaline reaction; its solution mixed with mucilage of starch gives a blue colour on the addition of a minute quantity of solution of chlorine. It gives a crystalline precipitate with tartaric acid. The addition of tartaric acid and mucilage of starch to its watery solution does not develope a blue colour. Solution of nitrate of silver added in excess forms a yellowish-white precipitate, which, when agitated with ammonia, yields by subsidence a clear liquid in which excess of nitric acid causes no turbidity. Its aqueous solution is only faintly precipitated by the addition of saccharated solution of lime.

Preparations Containing Iodide of Potassium.

Linimentum Iodi	22 grains	in 1 fluid ounce, nearly.	
,, Potassii Iodidi cum sapone	$54\frac{1}{2}$	,,	,, ,,
Liquor Iodi ...	... 30	,,	,, ,,
Tinctura Iodi ...	... $5\frac{1}{2}$	,,	,, ,,
Unguentum Iodi	... 16	,,	1 ounce, nearly.
,, Potassii Iodidi	1 part	,,	$8\frac{3}{4}$, nearly.

Action.—Is an alterative and deobstruent, and is much used in secondary and tertiary syphilis for combating skin affections, sore throat, nodes, night pains, &c. It is also used as an antidote to lead and to mercury poisoning, but must be given cautiously as, by rendering the deposits of these metals in the system soluble, it at first aggravates the symptoms of poisoning. It has been recommended in doses of from 20 to 30 grs., 3 times a day, in cases of internal aneurism, as it is believed to induce contraction of the sac and consolidation of the aneurismal tumour. If pushed too much it may induce *iodism*.

Dose.—From 2 to 10 grs. but much larger doses are sometimes prescribed.

Incompatibles.—Vegetable infusions containing Starch, and Bismuth, Spiritus Ætheris Nitrosi.

PLUMBI IODIDUM.

PbI_2.

Preparations.

Emplastrum Plumbi Iodidi	...	1 part in. 9.
Unguentum ,, ,,	...	1 ,, ,, 8.

Action.—Used externally in scrofulous enlargements of glands and joints, and in some skin diseases.

SULPHURIS IODIDUM.

Iodide of Sulphur.

Characters and Tests.—A greyish black solid substance, with a radiated crystalline appearance. It resembles iodine in smell, and in the property of staining the cuticle when applied to it. Soluble in about sixty parts of glycerine; insoluble in water, but decomposed when boiled with it. If 100 grains be thoroughly boiled with water the iodine will pass off in vapour and about 20 grains of sulphur will remain.

Preparation.

Unguentum sulphuris Iodidi, 30 grains to 1 ounce.

Action.—Very rarely used internally, but forms a valuable remedy as an ointment in obstinate eczema, psoriasis, or acne, and as an application to enlarged glands. When long administered or given in large doses, it sometimes produces the train of symptoms called *iodism.*

Dose.—$\frac{1}{2}$ grain.

IODOFORM.

Synonyms.—Iodoformum, Teriodide of Formyl.

Characters.—Small, pearly, yellow crystals, with a sweet taste and the odour of saffron. Insoluble in water but soluble in alcohol, ether, chloroform and fixed and volatile oils.

Action.—Alterative and deobstruent, and locally anodyne and irritant. Given internally in the latter forms of syphilis applied to indolent ulcers it induces healthy action,

and it is also useful in scaly skin diseases. It may be applied to ulcers in small quantities in the form of powder, or made into a dilute ointment with vaseline or lard.

Dose.—$\frac{1}{2}$ to 1 or 2 grs.

BROMUM. Br. 80.

Bromine.

124. A liquid non-metallic element, obtained from sea-water and from some saline springs.

Characters and Tests.—A dark brownish-red, very volatile liquid, with a strong and disagreeable odour. Its specific gravity is 2·966. At the common temperature of the air it gives off red vapours, and at a temperature of 117° it boils. Agitated with solution of soda in such proportion that the fluid remains very slightly alkaline, it forms a colourless liquid, which, if coloured by the farther addition of a small quantity of the bromine, does not become blue on the subsequent addition of a cold solution of starch.

Preparations.

Ammonii Bromidum | Potassii Bromidum

Action.—Rarely used in its free state in medicine. Topically it is an irritant like iodine, but stronger. In large doses it is highly irritant, in moderate doses it helps to remove glandular swellings, and acts vigorously on the lymphatic system. In large continued doses it induces a train of symptoms called *Bromism;* the patient suffering from debility, headache, colic, irritability of stomach, diarrhœa and at times salivation.

AMMONII BROMIDUM.

Bromide of Ammonium.

NH_4Br.

Characters and Tests.—In colourless crystals, which become slightly yellow by exposure to the air, and have a pungent saline taste. May be sublimed unchanged by the application of heat. Readily soluble in water; less soluble in spirit. A solution of the salt in water, mixed with mucilage of starch and a drop of an aqueous solution of bromine or chlorine, does not exhibit any blue colour.

Action.—A good nervine sedative, and may be used as a substitute for, or in combination with, bromide of potassium. It is useful in hysteria, in headache resulting

from uterine irritation, in sleeplessness, and hooping cough. It is also deobstruent and anaphrodisiac. It has much the same action as bromide of potassium and is not so apt to induce *bromism*. It is also said to reduce obesity.

Dose.—5 to 20 grs.

POTASSII BROMIDUM.

Bromide of Potassium.

KBr.

Characters.—In colourless cubical crystals, with no odour, but a pungent saline taste, readily soluble in water, less soluble in spirit. Its aqueous solution gives a white crystalline precipitate with tartaric acid. When its solution in water is mixed with a little chlorine, chloroform agitated with it, on falling to the bottom, exhibits a red colour. Ten grains require for complete decomposition 840 grain-measures of the volumetric solution of nitrate of silver. A solution of the salt mixed with mucilage of starch and a drop of an aqueous solution of bromine or chlorine does not exhibit any blue colour.

Action.—A drug of great value, being physiologically a sedative of both the nervous and circulatory systems. Unlike opium it induces no preliminary excitement; but it produces anæsthesia of the velum palati and pharynx. It is one of the most effectual remedies known for epilepsy, and is most useful in the treatment of mania, nymphomania, chorea, tetanus, palpitation, and uterine pains. It is also employed for securing sleep in the case of overworked brain, &c., for relieving headache especially that arising from uterine irritation, in cough including hooping-cough, &c.

Dose.—5 to 30 grs.

Incompatibles.—Acids and acidulous salts.

CHLORINE. Cl. 35·5.

125. *Character*—Is a gas of a greenish-yellow colour, pungent odour and astringent taste. It has powerful bleeching properties, and combines with hydrogen in various proportions. It is also a valuable deodoriser. It is not respirable, and is a local irritant. Internally in medicinal doses it is alterative, tonic and antiseptic.

Preparations.

Liquor chlori.

Calx Chlorata.

Chlorinated Lime.

Character and Tests.—A dull white powder with a feeble odour of chlorine, partially soluble in water. The solution evolves chlorine copiously upon the addition of oxalic acid, and deposits at the same time oxalate of lime. Ten grains mixed with thirty grains of iodide of potassium, and dissolved in four fluid ounces of water, produce, when acidulated with two fluid drachms of hydrochloric acid, a reddish solution, which requires for the discharge of its colour at least 850 grain-measures of the volumetric solution of hyposulphite of soda, corresponding to 30 per cent. of chlorine liberated by hydrochloric acid.

Preparations.

Liquor Calcis Chloratæ ... 2 ounces to 1 pint.

Vapor Chlori.

Action.—This preparation is seldom used internally. Its chief use is as a disinfectant. The liquor is sometimes used for gargles in putrid sore throat, and in lotions for foul ulcers. Employed as a disinfectant it may be sprinkled about the room, or exposed in shallow dishes. The *Liquor sodæ chloratæ* is used in similar cases.

Acidum Hydrochloricum.

Hydrochloric Acid.

Acidum Muriaticum Purum, *Edin.*, and *Dubl.*

Syn.—*Hind.* and *Dak.* Namakka-tezab; *Tam.* Lavana-diravakam; *Tel.* Lavana-dravakam; *Beng.* Nuner-tejab.

Characters and Tests.—A nearly colourless and strongly acid liquid, emitting white vapours having a pungent odour. Specific gravity 1·16. When evaporated to dryness, it leaves no residue. It gives with nitrate of silver a curdy white precipitate, soluble in excess of ammonia, insoluble in nitric acid. 114·8 grains by weight, mixed with half an ounce of distilled water, require for neutralization 1,000 grain-measures of the volumetric solution of soda. When diluted with four times its volume of distilled water it gives no precipitate with solution of chloride of barium or with sulphuretted hydrogen, and does not tarnish or alter the colour of bright copper foil when boiled with it. If a fluid drachm of it mixed with half an ounce of distilled water be put into a small flask with a few pieces of granulated zinc, and while the effervescence continues a slip of bibulous paper wetted with solution of subacetate of lead be suspended in the upper part of the flask above the liquid for about five minutes, the paper will not become discoloured.

Preparations containing free Hydrochloric acid.

Acidum Hydrochloricum dilutum.
„ Nitro-hydrochloricum dilutum.
Liquor Antimonii Chloridi.
„ Arsenici Hydrochloricus.
„ Morphiæ Hydrochloratis.

Officinal Chlorides.

Ammonii Chloridum.
Antimonii Chloridi, Liquor.
Arsenici Hydrochloricus, Liquor.
Calcii Chloridum.
Ferri Perchloridi, Liquor.
„ „ „ fortior.
Hydrargyri Perchloridum.
Hydrargyri Perchloridum Liquor.
„ Subchloridum.
Morphiæ Hydrochloras.
„ Hydrochloratis, Liquor.
Sodii Chloridum.
Tinctura Ferri Perchloridi.
Zinci Chloridum.
„ Chloridi Liquor.

Action.—Acts locally as a caustic, and is some times used as a topical application in foul ulcers and in diphtheria.

ACIDUM HYDROCHLORICUM DILUTUM.

Diluted Hydrochloric Acid.

Synonym.—Acidum Muriaticum Dilutum, *Edin.*

Tests.—Specific gravity 1·052. 345 grains by weight (6 fluid drachms) require for neutralisation 1,000 grain-measures of the volumetric solution of soda, corresponding to 10·58 per cent. of real acid. Six fluid drachms contain one equivalent or 36·5 grains of hydrochloric acid HCl.

Action.—Tonic and refrigerant; but must be given well diluted. Sometimes useful in chronic affections of the liver, also given in cases of phosphatic deposits and secondary syphilis; and used in ulcerated sore throat as a gargle, in the proportion of 1 dr. to 8 or 9 ounces of water.

Dose.—10 to 30 minims with bitter infusions.

CARBO ANIMALIS.

Animal Charcoal, Bone Black.

126. *Syn.*—*Hind.* Haddi-ka-koyelah; *Dak.* Huddi-ka-kolsa; *Tam.* Elumbu-kari; *Tel.* Emika-boggu.

The residue of bones, which have been exposed to a red heat without the access of air. It consists principally of charcoal, and phosphate and carbonate of lime.

Preparation.—Carbo animalis purificatus.

CARBO ANIMALIS PURIFICATUS.

Purified Animal Charcoal.

Animal charcoal from which the earthy salts have been almost wholly removed.

Characters.—A black pulverulent substance; inodorous and almost tasteless. Tincture of litmus diluted with twenty times its bulk of water, agitated with it and thrown upon a filter, passes through colourless. When burned at a high temperature with a little red oxide of mercury and free access of air, it leaves only a slight residue.

Action.—Chiefly used in pharmacy as a decolorising agent, and is said to be an antidote in poisoning by the vegetable alkaloids. Disinfectant and deodoriser.

Dose.—20 to 60 grains.

CARBO LIGNI.

Wood Charcoal.

Syn.—Hind. Lakri-ka-koyelah; *Dak.* Lakri-ka-kolsa; *Tam.* Aduppu-kari; *Tel.* Katta-boggu.

Wood charred by exposure to a red heat without access of air.

Characters.—In black brittle porous masses, without taste or smell, very light, and retaining the shape and texture of the wood from which it was obtained. When burned at a high temperature with free access of air, it leaves not more than two per cent. of ash.

Preparation.—Cataplasma Carbonis.

Action.—An efficient deodoriser and disinfectant. Given internally in cases of flatulence and offensive eructations. Externally it is used to destroy the fœtor of foul ulcers, and as a respirator to protect the lungs from poisonous gases. It is an important agent in the common water filter.

Dose.—20 to 60 grains.

BORON, B. 11.

127. Boron exists as a dark olive coloured powder, devoid of taste and smell. When heated it is changed into Boracic acid.

Boracic Acid.

Occurs in white scaly crystals of a pearly lustre, soluble in hot water and alcohol. Used as a test for Rhubarb.

Action.—Forms an excellent antiseptic dressing for wounds, being less stimulating than carbolic acid. It may be applied on lint moistened with a saturated solution, or as an ointment containing 1 part of acid to 3 oz. of simple ointment.

Borax.

Borax.

Synonym.—Sodæ Biboras, *Dubl.*

$$Na_2 B_4 O_7 \cdot 10 H_2 O.$$

Characters and Tests.—In transparent colourless crystals, some times slightly effloresced, with a weak alkaline reaction; insoluble in rectified spirit, soluble in water. A hot saturated solution, when acidulated with any of the mineral acids lets fall, as it cools, a scaly crystalline deposit (boracic acid), the solution of which in spirit burns with a green flame. 191 grains dissolved in 10 fluid ounces of distilled water require for saturation 1,000 grain-measures of the volumetric solution of oxalic acid.

Preparations.

Glycerinum Boracis	... ...	1 part in 6 by weight.
Mel ,,	... ...	56 grains in 1 ounce.

Action.—Chiefly used as a gargle in sore throat, ulceration of the mouth and ptyalism. As a lotion it is valuable in sore nipples, pityriasis versicolor, prurigo and other skin diseases. Is considered emenagogue, and therefore sometimes given, combined with ergot, to act on the uterus and cause expulsion of the placenta.

Dose.—5 to 40 grs.

Incompatibles.—Mineral acids.

Metallic Bodies.

I.—Metals of the Alkalies.

AMMONIUM NH_4 18.

128. May be termed a hypothetical metal, inasmuch as it is not capable of existing in the free state. It is a basylous radicle, playing in the ammonia salts the same part as potassium and sodium do in their compounds.

Ammonia.

NH_3. 17.

Characters.—A colourness, pungent smelling, suffocating gas, with caustic and alkaline properties. It is produced during the decomposition of animal matters, and is given off freely by stale urine. It may be liquefied either by a very low temperature or by great pressure.

Preparations.

Liquor ammoniæ fortior.
„ ammoniæ.

Ammoniæ Benzoas.

Benzoate of Ammonia.

$NH_4 C_7 H_5 O_2$.

Characters and Tests.—In colourless laminar crystals, soluble in water and in alcohol. It gives a bulky yellowish precipitate with persalts of iron. Its aqueous solution when heated with caustic potash evolves ammonia, and, if it be not too dilute, when acidulated with hydrochloric acid it gives a deposit of benzoic acid. When heated it sublimes without any residue.

Action.—A stimulant diuretic, its benzoic acid being converted into hippuric acid. It is useful in gout when chalk stones are being deposited, and has been recommended for chronic catarrh of the bladder with alkaline urine. It also acts on the pulmonary mucous membrane as a stimulant.

Dose.—Dose 10 to 30 grains in solution. Not very soluble in water.

Incompatibles.—Acids, salts of Iron and Liquor Potassæ.

Ammoniæ Carbonas.

Carbonate of Ammonia.

Synonym.—Ammoniæ Sesquicarbonas, *Lond.*, *Dubl.*

$N_4 H_{16} C_3 O_8$.

Characters and Tests.—In translucent crystalline masses, with a strong ammoniacal odour, and alkaline reaction; soluble in cold water, more sparingly in spirit. It volatilises entirely when heated, and is readily dissolved by acids with effervescence. If diluted nitric acid be added to it in slight excess, and the solution be boiled, it will give no precipitate with chloride of barium or nitrate of

silver. Fifty-nine grains dissolved in one ounce of distilled water will be neutralised by 1,000 grain-measures of the volumetric solution of oxalic acid.

20 grains of Carbonate of Ammonia.	neutralise	23½ grains Citric acid. 25½ „ Tartaric acid.

Action.—In large doses it acts as a stimulant emetic, and may be useful as such in narcotic poisoning. In moderate doses it is antacid, stimulant, diaphoretic and expectorant. Used as a stimulant to the nervous system by inhaling its fumes through the nostrils.

Preparations in which Carbonate of Ammonia is used.

Liquor ammoniæ acetatis.
Spiritus ammoniæ aromaticus.

Dose.—20 to 30 grs. as an emetic; 3 to 10 grs. as a stimulant, &c.

Incompatibles.—Acids, Alkalies, Lime water, Magnesia and many Metallic salts.

AMMONIÆ NITRAS.

Nitrate of Ammonia.

$NH_4 NO_3$.

Characters and Tests.—A white deliquescent salt, in confused crystalline masses, having a bitter acrid taste. Soluble in less than its own weight of water, and sparingly soluble in rectified spirit. A solution of one part in eight parts of distilled water gives no precipitate with solution of nitrate of silver or of chloride of barium. Heated with caustic potash, it evolves ammonia; with sulphuric acid it emits nitric acid vapour. It fuses at a temperature of 320°, and at 350° to 450° it is entirely resolved into nitrous oxide gas. N_2O, and the vapour of water.

Action.—Used only for preparing laughing gas, but to render the gas fit for inhalation it should be passed through solution of potash and a solution of ferrous sulphate, to free it from any trace of acid or nitric oxide which it might contain.

AMMONIÆ PHOSPHAS.

Phosphate of Ammonia.

$(NH_4)_2 HPO_4$.

Characters and Tests.—In transparent colourless prims. Soluble in water, insoluble in rectified spirit. When heated with caustic potash, ammonia is evolved. The aqueous solution gives a yellow

precipitate with nitrate of silver. If twenty grains of this salt be dissolved in water and solution of ammonio-sulphate of magnesia added, a crystalline precipitate falls, which, when well washed upon a filter with solution of ammonia diluted with an equal volume of water, dried, and heated to redness leaves 16·8 grains.

Action.—Used in gout and uric acid diathesis, as it renders the urates of soda and lime soluble. Also prescribed in rheumatism.

Dose.—5 to 20 grs. in solution in water.

Ammonii Chloridum.

Chloride of Ammonium.

Ammoniæ Hydrochloras, 1864.

„ Murias, *Edin.*, *Dubl.*

Sal Ammoniac.

NH_4Cl

Syn.—*Hind.* Nousadar; *Dak.* Nousagar; *Tam.* Navach-charam; *Tel.* Nava-charam; *Can.* Nava-sagara; *Beng.* Noshagar.

Characters and Tests.—In colourless inodorous translucent fibrous masses, tough, and difficult to powder; soluble in water and in rectified spirit. Its aqueous solution when heated with caustic potash evolves ammonia, and when treated with nitrate of silver forms a copious curdy precipitate. When heated it volatilises without decomposition, and leaves no residue.

Action.—Has of late years, on the recommendation of Deputy Surgeon General W. Stewart M. D.,* been much employed in the treatment of hepatic disease, with the object of relieving congestion and preventing abscess of the liver. Its use is contra-indicated when there is pyrexia and a dry state of the skin, until these symptoms have been relieved by acetate of ammonia. The medicine should be administered in 20 gr. doses 2 or 3 times daily, and the patient strictly confined to bed: at the same time rich, fat or indigestible articles of food should be interdicted, as well as spirits, wine, beer and spices. As a rule about

* "Clinical researches on the therapeutic action of chloride of ammonium in the treatment of hepatic disease," by W. Stewart, M.D., &c., London, 1879.

15 minutes after a dose of the medicine the patient has a feeling of warmth at the epigastrium, which gradually extends over the abdomen and cutaneous surface. He then feels "light-headed" or at times drowsy, and the pain in the hepatic region ceases or is referred to a point higher up. Subsequently perspiration breaks out and lasts for 1 or 2 hours. Similar effects follow subsequent doses, the urine is increased, and in due course a complete relief from pain and pyrexia may be expected. The drug is also used in chronic bronchitis, in neuralgia, rheumatism, and in scrofulous and syphilitic enlargement of the glands. Externally it is employed as a discutient and refrigerant lotion.

Dose.—10 to 20 grs. in a bitter infusion, or with spirit of chloroform.

Incompatibles.—Strong acids; Potash, Soda, Lime and their carbonates.

POTASSIUM K. 39.

129. A soft, bluish white, brittle metal, tarnishing on exposure to the air. When thrown on water it floats and burns with great brilliancy. Its compounds are abundantly distributed in nature, and it is the metallic base of the following articles.

Potassa Caustica.

Caustic Potash.

Synonyms.—Potassæ Hydras, *Lond.*, Potassa, *Ed.*

Hydrate of potash, or **KHO**, containing some impurities.

Characters and Tests.—In hard white pencils, very deliquescent, powerfully alkaline and corrosive. A watery solution acidulated by nitric acid gives a yellow precipitate with perchloride of platinum, and only scanty white precipitates with nitrate of silver and chloride of barium. Fifty-six grains dissolved in water leave only a trace of sediment, and require for neutralisation at least 900 grain-measures of the volumetric solution of oxalic acid.

Preparation containing Caustic Potash.

Liquor Potassæ ... ... 27 grains in 1 fluid ounce.

Preparation in which Caustic Potash is used.

Potassæ Permanganas.

Preparations containing Potassium and its Compounds.

Antimonium Tartaratum.
Confectio Sulphuris.
Decoctum Aloes Compositum.
Enema Aloes.
Ferrum Tartaratum.
Linimentum Iodi.
„ Potassii Iodidi cum Sapone.
„ Terebinthinæ.
Liquor Arsenicalis.
„ Iodi.
„ Potassæ.
„ „ effervescens.
„ „ Permanganatis.
Mistura Ferri composita.
Pilula Colocynthidis composita.
„ „ et Hyoscyami.
Pulvis Ipecacuanhæ compositus.
„ Jalapæ compositus.
Potassa Caustica.
Potassa Sulphurata.
Potassæ Acetas.
„ Bicarbonas.
„ Bichromas.
„ Carbonas.
„ Chloras.
„ Citras.
„ Nitras.
„ Permanganas.
„ Prussias flava.
„ Sulphas.
„ Tartras.
„ „ Acida.
Potassii Bromidum.
„ Iodidum.
Sapo Mollis.
Soda Tartarata.
Trochisci Potassæ Chloratis.
Unguentum Antimonii Tartarati.
„ Iodi.
„ Potassæ Sulphuratæ.
„ Potassii Iodidi.
Vinum Antimoniale.

Action.—Caustic potash is a powerful escharotic externally, and a corrosive poison internally. The antidotes in cases of poisoning are vinegar, lime juice, and demulcents. Used as a caustic it is apt to spread, and must therefore be applied with caution. It is never given internally as a medicine. The *Liquor potassæ* and *Liquor potassæ effervescens* are antacid, antilithic, and alterative; and are used in rheumatism, scrofula, syphilis, obesity, urinary diseases, &c.

Potassæ Acetas.

Acetate of Potash.

$$KC_2 H_3 O_2.$$

Characters and Tests.—White foliaceous satiny masses, very deliquescent, with a watery solution of which, tartaric acid causes a

crystalline precipitate, sulphuric acid the disengagement of acetic acid, and a dilute solution of perchloride of iron strikes a deep red colour. Neutral to test paper, entirely soluble in rectified spirit. Its solution is unaffected by sulphide of ammonium.

Preparation in which Acetate of Potash is used.

Tinctura Ferri Acetatis.

Action.—Diuretic rendering the urine alkaline, and laxative. Used in dropsy and in acute rheumatism.

Dose.—10 to 20 grs. as a diuretic, as a laxative 2 drs.

Potassæ Carbonas.

Carbonate of Potash.

Syn.—Hind. Ouk-chhar; *Dak.* Rak-ka-namak; *Tam.* Shambal-vuppu; *Tel.*—Manu-vuppu.

$K_2 CO_3$ with about 16 per cent. of water of crystallisation.

Characters and Tests.—A white crystalline powder, alkaline and caustic to the taste, very deliquescent, readily soluble in water but insoluble in spirit, effervescing with diluted hydrochloric acid, and forming a solution with which perchloride of platinum gives a yellow precipitate. Loses about sixteen per cent. of its weight when exposed to a red heat. When supersaturated with nitric acid, and evaporated to dryness, the residue is almost entirely soluble in water, only a little silica remaining undissolved; and the solution is precipitated only faintly by chloride of barium, and nitrate of silver. Eighty-three grains require for neutralization at least 980 grain-measures of the volumetric solution of oxalic acid.

20 grains Carbonate of Potash } neutralise { 17 grains Citric acid or / 18 „ Tartric acid.

Preparations in which Carbonate of Potash is used.

Atropia.	Potassa Sulphurata.
Decoctum Aloes compositum	Potassæ Acetas.
Enema Aloes.	„ Bicarbonas.
Liquor Arsenicalis.	„ Chloras.
„ Potassæ.	„ Citras.
Mistura Ferri Composita.	„ Tartras.

Action.—Antacid, alterative, antilithic and diuretic. Externally it is used for eczema and other skin diseases.

Dose.—10 to 30 grs.

Potassæ Bicarbonas.

Bicarbonate of Potash.

$KHCO_3$.

Characters and Tests.—Colourless right rhombic prisms, not deliquescent, of a saline feebly alkaline taste, not corrosive. Diluted hydrochloric acid causes strong effervescence, forming a solution with which perchloride of platinum gives a yellow precipitate. Fifty grains exposed to a low red heat, leave thirty-four and a half grains of a white residue, which require for exact saturation 500 grain-measures of the volumetric solution of oxalic acid.

20 grains Bicarbonate of Potash.	neutralise	14 grains Citric acid, or 15 ,, Tartaric acid.

Preparation containing Bicarbonate of Potash.

Liquor Potassæ effervescens ... 30 grains in 1 pint.

Action.—Antacid, diuretic, and antilithic; used in dyspepsia, acid urine, and acute rheumatism. For dyspepsia it should be given with a bitter infusion.

Dose.—10 to 20 grs. as an antacid, and 60 grs. as a diuretic.

Potassæ Bichromas.

Bichromate of Potash.

$K_2 Cr_2 O_7$.

Characters and Tests.—In large red, transparent four-sided tables; anhydrous; fuses below redness; at a higher temperature is decomposed, yielding green oxide of chromium and yellow chromate of potash, which may be separated by dissolving the latter in water. The bichromate dissolved in water gives a yellowish-white precipitate with chloride of barium, and a purplish red precipitate with nitrate of silver, and both these precipitates are soluble in diluted nitric acid. The solution also when digested with sulphuric acid and rectified spirit acquires an emerald green colour.

Preparation in which Bichromate of Potash is used.

Sodæ Valerianas.

Action.—Externally caustic and internally irritant. Has been tried in doses of one $\frac{1}{5}$th of a grain as an alterative in secondary syphilis. Used extensively in the arts.

Potassæ Chloras.

Chlorate of Potash.

$KClO_3$.

Characters and Tests.—In colourless rhomboidal crystalline plates, with a cool saline taste sparingly soluble in cold water. It explodes when triturated with sulphur. Its solution is not affected by nitrate of silver, or oxalate of ammonia. By heat it fuses, gives off oxygen gas, and leaves a white residue, readily forming with water a neutral solution, which is precipitated white by nitrate of silver, and yellow by perchloride of platinum.

Preparations in which Chlorate of Potash is used.

Potassæ Permanganas.

Trochisci Potassæ Chloratis ... 5 grains in each lozenge.

Action.—As a local application it is useful in chronic sore throat, stomatitis, spongy gums, ulceration of the mouth, and diphtheria. It has been thought capable of yielding oxygen to the blood, and therefore administered in the low stage of febrile diseases. It is useful in chronic bronchitis, fetid breath and salivation.

Dose.—10 to 30 grs.

Potassæ Citras.

Citrate of Potash.

$K_3C_6H_5O_7$

Characters and Tests.—A white powder of saline feebly acid taste, deliquescent, and very soluble in water. Heated with sulphuric acid it forms a brown fluid, gives off an inflammable gas, and evolves the odour of acetic acid. Its solution, mixed with a solution of chloride of calcium, remains clear till it is boiled, when a white precipitate separates, readily soluble in acetic acid. Its solution, acidulated with hydrochloric acid, gives a yellow precipitate with perchloride of platinum. 102 grains heated to redness till gases cease to be evolved leave an alkaline residue, which requires for exact neutralisation 1,000 grain-measures of the volumetric solution of oxalic acid.

Action.—Is diaphoretic, diuretic, antiscorbutic and laxative. Given in gout, rheumatism, uric acid gravel and febrile diseases.

Dose.—20 to 60 grs.

Potassæ Nitras.

Nitrate of Potash.

KNO_3.

Characters and Tests.—In white crystalline masses or fragments of striated six-sided prisms, colourless, of a peculiar cool saline taste. Thrown on the fire it deflagrates; warmed in a test tube with sulphuric acid and copper wire it evolves ruddy fumes. Its solution acidulated with hydrochloric acid gives a yellow precipitate with perchlorade of platinum. Its solution is not affected by chloride of barium or nitrate of silver.

Action.—In large doses irritant; but in medicinal doses diuretic, diaphoretic and refrigerant. Also a sedative of the circulatory system, and used for this effect in inflammatory diseases. Used as a diuretic in some forms of dropsy. The fumes of paper soaked in a strong solution of the salt and then burned will sometimes, when inhaled, afford relief in asthma. In acute rheumatism it is occasionally given in large doses. Combined with sal ammoniac it forms a cooling lotion.

Dose.—10 to 30 grs.

Potassæ Prussias Flava.

Yellow Prussiate of Potash.

Synonym.—Ferrocyanide of Potassium.

$K_4 Fe C_6 N_6 . 3 H_2 O$.

Characters and Tests.—In large yellow crystals, permanent in the air, soluble in water, insoluble in alcohol. The aqueous solution precipitates deep blue with persulphate of iron, brick-red with sulphate of copper, and white with acetate of lead. Heated with diluted sulphuric acid, hydrocyanic acid vapours are evolved.

Action.—Used to prepare

Acidum Hydrocyanicum dilutum.

Potassæ Permanganas.

Permanganate of Potash.

$K Mn O_4$.

Characters and Tests.—Dark purple slender prismatic crystals, inodorous, with a sweet astringent taste, soluble in water. A single small crystal suffices to form with an ounce of water, a rich purple

solution, which, when mixed with a little rectified spirit and heated, becomes yellowish-brown. The crystals heated to redness decrepitate, evolve oxygen gas, and leave a black residue, from which water extracts potash, recognised by its alkaline reaction, and by its giving, when acidulated with hydrochloric acid, a yellow precipitate with perchloride of platinum. Entirely soluble in cold water. Five grains dissolved in water require for complete decoloration a solution of forty-four grains of granulated sulphate of iron acidulated with two fluid drachms of diluted sulphuric acid.

Preparations.

Liquor Potassæ Permanganatis, 4 grains in 1 fluid ounce.

Action.—A powerful antiseptic and disinfectant; and is also used as an application for foul ulcers, and as a gargle for ulceration of the mouth or throat with offensive discharges. It has been recommended for diabetes in doses of 2 to 4 grs. in water. Under the name of *Condy's fluid* it is much used for purifying sick rooms, cess-pools, latrines, drains, &c., and when thus employed should be sprinkled about or exposed in open vessels. The *liquor potassæ permanganatis* forms a very delicate test for the presence of organic matter in water or air, owing to the facility with which it yields up its oxygen. When such matter is present the permanganate acquires a yellowish brown tinge, the change in colour being in direct proportion to the amount of organic substances in the fluid under test. It is also used as a disinfectant and deodoriser, and should always be kept in a glass stoppered bottle as it is decomposed by contact with cork.

Dose.—1 to 2 grs.

Potassæ Sulphas.

Sulphate of Potash.

K_2SO_4.

Characters and Tests.—In colourless hard six-sided prisms terminated by six-sided pyramids; decrepitates strongly when heated; sparingly soluble in water; insoluble in alcohol. The aqueous solution is neutral to test paper, gives no precipitate with oxalate of ammonia, but acidulated with hydrochloric acid it is precipitated white by chloride of barium, and yellow by perchloride of platinum.

Preparations.

Pilula Colocynthidis composita.
" " et Hyoscyami.
Pulvis Ipecacuanhæ compositus... 4 parts in 5.

Action.—A mild cathartic, and especially useful in jaundice and hepatic affections. It is used in Dover's powder to aid the thorough pulverisation of the ipecacuan.

Dose.—15 to 60 grs.

Potassæ Tartras.

Tartrate of Potash.

$K_2 C_4 H_4 O_6$.

Characters and Tests.—In small colourless four or six-sided prisms. Heated with sulphuric acid it forms a black tarry fluid, evolving inflammable gas and the odour of burned sugar. Acetic acid added sparingly to its solution causes the separation of a white crystalline precipitate. Entirely dissolved by its own weight of water. 113 grains, heated to redness till gases cease to be evolved, leave an alkaline residue, which requires for exact neutralization 1000 grain-measures of the volumetric solution of oxalic acid.

Action.—In small doses diuretic; in larger doses it acts as a mild cooling cathartic.

Dose.—As a diuretic 20 to 60 grs.; as a cathartic up to ½ oz.

Potassæ Tartras Acida.

Acid Tartrate of Potash.

Synonyms.—Potassæ Bitartras.
Cream of Tartar.

$KHC_4 H_4 O_6$.

Characters and Tests.—A gritty white powder, or fragments of cakes crystallised on one surface; of a pleasant acid taste, sparingly soluble in water, insoluble in spirit. Heated in a crucible it evolves inflammable gas and the odour of burned sugar, and leaves a black residue. This effervesces with diluted hydrochloric acid, and forms a solution which when filtered gives a yellow precipitate with perchloride of platinum, and when neutralised by ammonia is rendered

slightly turbid by oxalic acid. 188 grains heated to redness till gas ceases to be evolved, leave an alkaline residue, which requires for exact neutralization 1000 grain-measures of the volumetric solution of oxalic acid.

Preparations in which Acid Tartrate of Potash is used.

Acidum Tartaricum.
Antimonium Tartaratum.
Confectio Sulphuris.
Ferrum Tartaratum.
Potassæ Tartras.
Pulvis Jalapæ compositus.
Soda Tartarata.

Action.—Diuretic, cathartic and refrigerant. A solution of it in water, flavoured with orange peel and sweetened with sugar, makes a pleasant refrigerant beverage in slight febrile attacks. Used for fevers, inflammatory diseases, dropsies, &c., also in *confect. sulphur.* for hæmorrhoids, &c.

Dose.—10 to 60 grs. as a diuretic, and up to 180 grs. as a cathartic.

SODIUM Na. 23.

130. This metallic base is abundant in nature, in the form of chloride. It is a soft, malleable, silver-white metal, which floats on water and effervesces in consequence of the liberation of the hydrogen of the water. It readily oxidises on exposure to the air.

Soda Caustica.

Caustic Soda.

Hydrate of Soda, **NaHO**, with some impurities.

Characters and Tests.—Hard and greyish-white, very alkaline and corrosive. It imparts a yellow colour to flame, and its solution in water acidulated by nitric acid gives only scanty white precipitates with nitrate of silver and chloride of barium. Forty grains dissolved in water leave scarcely any sediment, and require for neutralization about 900 grain-measures of the volumetric solution of oxalic acid.

Preparation containing Caustic Soda.

Liquor Sodæ ... ... 18·8 grains in 1 fluid ounce.

Preparations containing Sodium and its Compounds.

Borax.
Cataplasma Sodæ Chloratæ.
Emplastrum Belladonnæ.
„ Calefaciens.
„ Cerati Saponis.
„ Opii.
„ Resinæ.
„ Saponis.
Extractum Colocynthidis compositum.
Fel Bovinum purificatum.
Linimentum Opii.
„ Potassii Iodidi cum sapone.
„ Saponis.
Liquor sodæ
„ „ Arseniatis.
„ „ chloratæ.
„ „ effervescens.
Pilula Aloes Barbadensis.
„ „ et Assafœtidæ.
Pilula Aloes socotrinæ.
„ Cambogiæ composita.
„ Rhei composita.
„ Saponis composita.
„ Scillæ composita.
Sapo Durus.
Soda Caustica.
„ Tartarata.
Sodæ Acetas.
„ Arsenias.
„ Bicarbonas.
„ Carbonas.
„ „ exsiccata.
„ Citro-tartras effervescens.
„ Nitras.
„ Phosphas.
„ Sulphas.
„ Valerianas.
Sodii Chloridum.
Trochisci Sodæ Bicarbonatis.

Action.—Caustic soda has much the same action as caustic potash.

SODÆ ACETAS.

Acetate of Soda.

$$Na\,C_2\,H_3\,O_2.\ 3\,H_2\,O.$$

Characters and Tests.—**In transparent colourless crystals, soluble in water, forming a solution neutral to test paper. The solution when dilute is not precipitated by chloride of barium or nitrate of silver.**

Preparations in which Acetate of Soda is used.

Ferri Arsenias.
„ Phosphas.
Syrupus Ferri Phosphatis.

Action.—**Used as a test, and in the preparation of the above named articles.**

Sodæ Bicarbonas.

Bicarbonate of Soda.

$NaHCO_3$.

Characters and Tests.—In powder or small opaque irregular scales, white, of a saline not unpleasant taste. Imparts a yellow colour to flame. Dissolves with much effervescence in diluted hydrochloric acid, forming a solution in which perchloride of platinum causes no precipitate. A solution of the salt in cold water gives a white and not a coloured precipitate with solution of perchloride of mercury. When supersaturated with nitric acid its solution scarcely precipitates with chloride of barium or nitrate of silver. Eighty-four grains exposed to a red heat leave fifty-three of an alkaline residue, which requires for neutralisation 1,000 grain-measures of the volumetric solution of oxalic acid.

20 grains of Bicarbonate of soda.	neutralise	16·7 grains of Citric Acid, or
		17·8 ,, Tartaric Acid.

Preparations containing Bicarbonate of Soda.

Liquor Sodæ effervescens ...	30 grains in 1 pint.
Sodæ Citro-tartras effervescens..	17 parts in 31.
Trochisci Sodæ Bicarbonatis ...	5 grains in each lozenge.

Action.—Is antacid and alterative, but it is not so effective in the lithic acid diathesis as bicarbonate of potash. Is useful as an antacid in dyspepsia, and in some forms of diarrhœa in children. It is also used locally in the treatment of some skin diseases. In toothache it will often relieve the pain temporarily, if a few grains are put into or near the cavity of the tooth. It is often combined with bitter infusions in treating dyspepsia, but must not be continued too long, or given if there are phosphates in the urine.

Dose.—10 to 60 grs.

Sodæ Carbonas.

Carbonate of Soda.

$Na_2CO_3 . 10H_2O$.

Characters and Tests.—In transparent colourless laminar crystals of a rhombic shape, efflorescent, with a harsh alkaline taste and strong alkaline reaction. It imparts a yellow colour to flame, and dissolves with effervescence in diluted hydrochloric acid, forming a solution which does not precipitate with perchloride of platinum.

By heat it undergoes aqueous fusion, and then dries up losing sixty-three per cent. of its weight. When supersaturated with nitric acid it precipitates only slightly with chloride of barium or nitrate of silver. One hundred and forty-three grains require for neutralisation at least 960 grain-measures of the volumetric solution of oxalic acid.

20 grains Carbonate of Soda.	neutralise.	9·7 grains Citric Acid. 10½ grains Tartaric Acid.

Preparations in which Carbonate of Soda is used.

Liquor Sodæ.	Soda Bicarbonas.
,, ,, Chloratæ.	,, Carbonas exsiccata.
Soda Tartarata.	,, Phosphas.
Sodæ Arsenias.	

Action.—Antacid and antilithic.

Dose.—5 to 30 grs.

Sodæ Carbonas Exsiccata.

Dried Carbonate of Soda.

$Na_2 CO_3$.

Action.—Is simply the carbonate deprived of its water of crystallisation, and according to Squire 53 grs. are equal to 143 of the crystallised salt.

Dose.—3 to 10 grs.

Sodæ Citro-Tartras Effervescens.

Effervescent Citro-tartrate of Soda.

Action.—A pleasant effervescent antacid, when taken with sugar in water. In doses of 2 or 3 drachms it is laxative. Must be kept in stoppered bottles as otherwise it absorbs moisture and undergoes decomposition.

Dose.—60 grs. to ¼ oz.

Sodæ Nitras.

Nitrate of Soda

$Na NO_3$.

Characters and Tests.—In colourless obtuse rhombohedral crystals, having a cooling saline taste. Thrown on the fire it defla-

grates; warmed in a test tube with sulphuric acid and copper wire, it evolves ruddy fumes. It is soluble in about two parts of cold distilled water. The solution gives no precipitate with nitrate of silver or chloride of barium.

Preparation in which Nitrate of Soda is used.

Sodæ Arsenias.

Action.—Only used to make the above mentioned preparation.

Sodæ Phosphas.

Phosphate of Soda.

$$Na_2 HPO_4 \cdot 12 H_2 O.$$

Characters and Tests.—In transparent colourless rhombic prisms, terminated by four converging planes, efflorescent, tasting like common salt. It imparts a yellow colour to flame. Its solution has a faintly alkaline reaction, it gives a yellow precipitate with nitrate of silver, the resulting fluid acquiring an acid reaction. Heated to dull redness it loses sixty-three per cent. of its weight, leaving a residue, which, when dissolved in water, gives with chloride of barium a precipitate almost entirely soluble in diluted nitric acid.

Preparations in which Phosphate of Soda is used.

Ferri Phosphas.
Syrupus Ferri Phosphatis.

Action.—Less disagreeable to the taste than Epsom or Glauber's salt, and is a mild cathartic. May be given to children in broth.

Dose.—$\frac{1}{4}$ to 1 oz.

Sodæ Hypophosphis.

Hypophosphite of Soda.

$$Na\,PH_2\,O_2.$$

Characters and Tests.—A white granular salt, having a bitter nauseous taste. Deliquescent, very soluble in water and in spirit, but insoluble in ether. At a red heat it ignites, emitting spontaneously inflammable phosphuretted hydrogen.

Action.—Nervine tonic and alterative, and supposed to be specially useful in phthisis, and in all diseases in which

phosphates are deficient. Has also been recommended for epilepsy, chorea, &c. Is supposed to have all the effects of phosphorus, without any of the risks of its administration.

Dose.—5 to 10 grs.

Sodæ Sulphas.

Sulphate of Soda.

$$Na_2 SO_4 . 10 H_2 O.$$

Characters and Tests.—In transparent oblique prisms; has a salt and bitter taste; effloresces on exposure to the air; soluble in water, insoluble in spirit. Exposed to heat in a porcelain crucible it loses 55·9 per cent. of water. Heated with solution of potash no odour of ammonia is evolved, and no precipitate is formed. Imparts a yellow colour to flame. Fifty-grains of it dissolved in distilled water and acidulated with hydrochloric acid, give by the addition of chloride of barium a white precipitate, which, when it has been washed and dried, weighs 72·2 grains.

Action.—Sulphate of soda or Glauber's salt is chiefly used in veterinary practice, and is more disagreeable in taste and harsher in action than Epsom salt. Is useful as a purgative in febrile cases being refrigerant.

Dose.—$\frac{1}{4}$ to 1 ounce.

Sodæ Valerianas.

Valerianate of Soda.

$$Na C_5 H_9 O_2.$$

Characters.—In dry white masses without alkaline reaction, entirely soluble in rectified spirit, and giving out a powerful odour of valerian on the addition of diluted sulphuric acid.

Preparation in which Valerinate of Soda is used.

Zinci Valerianas.

Action.—Antispasmodic, but rarely used except in preparing the valerianates.

Dose.—1 to 5 grs.

Soda Tartarata.

Tartarated Soda.

$$NaKC_4H_4O_6 \cdot 4H_2O$$

Synonyms.—Sodæ et Potassæ Tartras, 1864.
Sodæ Potassio-tartras, *Lond.*

Characters and Tests.—In colourless transparent prisms or halves of prisms of the right rhombic order, generally eight-sided; tasting like common salt. Heated with sulphuric acid it blackens, evolving inflammable gases and the odour of burnt sugar. It imparts a yellow colour to flame. A strong solution gives a crystalline precipitate with a small quantity of acetic acid. Entirely soluble in cold water. 141 grains heated to redness till gases cease to be evolved, leave an alkaline residue which requires for neutralisation 1,000 grain-measures of the volumetric solution of oxalic acid.

Action.—Chiefly used for making the well known *Seidlitz powder*, and is also known as *Rochelle salt.* Diuretic in small doses, rendering the urine alkaline; laxative in larger doses. The Seidlitz powder consists of tartarated soda 2 drs. and bicarbonate of soda 40 grs. *in one paper*; and tartaric acid 37 grs. *in another paper*.

Dose.—2 to 4 drs.

Sodii Chloridum.

Chloride of Sodium. Common Salt.

$$NaCl$$

Characters and Tests.—In small white crystalline grains, or transparent cubic crystals, free from moisture, has a purely saline taste, imparts a yellow colour to flame, is soluble in water. The solution is not precipitated by perchloride of platinum, but gives with nitrate of silver a white precipitate soluble in ammonia, but insoluble in nitric acid.

Preparations in which Chloride of Sodium is used.

Acidum Hydrochloricum.
Hydrargyri Perchloridum.
„ Subchloridum.

Action.—Externally used as a rubefacient and stimulant. Internally in large doses it acts as in irritant poison, and in quantities of one or two ounces will cause dangerous irrit-

ation of the intestinal canal. In small quantities it serves as a stimulant of digestion, and as an article of diet is absolutely essential for the maintenance of health. If withdrawn or reduced too much, disease is certain to follow. In the French Army the allowance of salt is 0·5 oz; in the Prussian 0·87; in the Russian 1·59; and in the English about 0·25 oz., per man daily. For Madras Native troops in British Burmah, the daily allowance is $\frac{3}{4}$ oz.; and for prisoners in Madras jails $\frac{1}{2}$ oz.* Medicinally salt is taken as an anthelmintic, and its use in food serves to prevent the appearance of intestinal parasites.

Dose.—1 or 2 table-spoonfuls prove emetic, and half an ounce may be given as an enema.

LITHIUM. L. 7.

131. Is a white or reddish-white metal, and the lightest of known solids. It burns in the air with a bright light, and is slightly malleable. It was at one time supposed to be peculiar to the mineral kingdom and hence its name, from λιθος *a stone.* It occurs in some *micas*, *felspars*, *fireclays*, the mineral *lepidolite*, &c.

LITHIÆ CARBONAS.

Carbonate of Lithia.

L_2CO_3.

Characters and Tests.—In white powder or in minute crystalline grains, alkaline in reaction, soluble in 100 parts of cold water, insoluble in alcohol. It dissolves with effervescence in hydrochloric acid; and the solution evaporated to dryness leaves a residue of chloride of lithium, which communicates a red colour to the flame of a spirit lamp, and redissolved in water, yields a precipitate with phosphate of soda. Ten grains of the salt neutralised with sulphuric acid and afterwards heated to redness leave 14·86 grains of dry sulphate of lithia, which when redissolved in distilled water, yields no precipitate with oxalate of ammonia or solution of lime.

Preparations in which Carbonate of Lithia is used.

Liquor Lithiæ Effervescens.

Lithiæ Citras.

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* King's "Madras Manual of Hygiene."

Action.—Administered in the uric acid diathesis. As it neutralises more acid than the carbonates of soda or potash, and as the urate of lithia is very soluble, it is eminently useful in gout or when there is an excess of uric acid in the urine. It is also diuretic and is best administered in the form of *Liqr. lithiæ effervesc.*, or in common äerated water.

Dose.—3 to 6 grs.

LITHIÆ CITRAS.

Citrate of Lithia.

$L_3 C_6 H_5 O_7$.

Characters and Tests.—A white amorphous powder, deliquescent, and soluble in water without leaving any residue. Heated to redness it blackens, evolving inflammable gases; and the residue, neutralised by hydrochloric acid, yields with rectified spirit a solution which burns with a crimson flame. Twenty grains of the salt, burned at a low red heat with free access of air, leave 10·6 grains of white residue.

Action.—This salt is used for the same purposes as the carbonate. It is very deliquescent and more soluble than the Carbonate.

Dose.—5 to 10 grs.

II.—Metals of the Alkaline Earths.

CALCIUM Ca. 40.

132. A yellowish-white metal, readily combining with the oxygen of the air or water.

CALX.

Lime.

Characters and Tests.—In compact masses of a whitish colour, which readily absorb water, and which, when rather less than their weight of water is added, crack and fall into powder with the development of much heat. The powder obtained by this process of slaking, when agitated with distilled water gives, after filtration, a clear solution which has an alkaline reaction, and yields a white precipitate with oxalate of ammonia. The powder obtained by slaking dissolves, without much residue and without effervescence, in diluted hydrochloric acid, and if the solution thus formed be

evaporated to dryness, and the residue redissolved in water, only a very scanty precipitate forms on the addition of saccharated solution of lime.

Preparation.—Calcis Hydras.

CALCIS HYDRAS.

Slaked Lime.

Hydrate of lime, $Ca\,H_2\,O_2$, with some impurities. Slaked lime should be recently prepared.

Preparations.

Liquor Calcis ... Liquor Calcis Saccharatus.

Action.—Is given in the form of *Liquor* or *Liquor calcis saccharatus.* The presence of sugar renders lime more soluble, and hence the saccharated solution is much stronger than the other. Lime is antacid and astringent, and therefore useful in some forms of diarrhœa. It is also antilithic, and from its alkaline properties useful in some cases of dyspepsia. Given in vomiting especially that during pregnancy, and used externally in some skin diseases.

Dose.—See *Liquor calcis* and *Liquor calcis saccharatus.*

CALCIS CARBONAS PRÆCIPITATA.

Precipitated Carbonate of Lime.

$$Ca\,CO_3.$$

Characters and Tests.—A white crystalline powder, insoluble in water, dissolving in hydrochloric acid with effervescence. The solution, when neutralised by ammonia, lets fall a copious white precipitate on the addition of oxalate of ammonia. With diluted nitric acid it gives a clear solution, which, if perfectly neutral and deprived of carbonic acid by boiling, is not precipitated by saccharated solution of lime added in excess, or by the solution of nitrate of silver.

Preparations containing Precipitated Carbonate of Lime.

Trochisci Bismuthi ...4 grains in each lozenge, nearly.

Action.—Antacid and astringent, and given in diarrhœa and dyspepsia. Used as an antidote for poisoning with mineral acids or oxalic acid.

Dose.—10 to 60 grs.

Incompatibles.—Acids and caustic alkalis.

Creta.

Chalk.

Syn.—Hind. Khari-mitti; *Dak.* Vilayati-chuna; *Tam.* Shimai-shunnambu; *Tel.* Shima-sunnam; *Can.* Shima-sunna; *Beng.* Khari-mati.

Native friable carbonate of lime. Used in producing carbonic acid gas.

Preparation.—Creta Præparata.

Creta Præparata.

Prepared Chalk.

Characters and Tests.—A white amorphous powder, effervescing with acids, and dissolving, with only a slight residue, in diluted hydrochloric acid. This solution, when supersaturated with solution of ammonia, gives, upon the addition of oxalate of ammonia, a copious white precipitate. The salt formed by dissolving the prepared chalk in hydrochloric acid, if rendered neutral by evaporation to dryness and redissolved in water, gives only a very scanty precipitate on the addition of saccharated solution of lime.

Preparations.

Hydrargyrum cum Creta	2 parts in	3.
Mistura Cretæ	1 part	32.
Pulvis Cretæ aromaticus	1 „	4.
„ „ cum opio ...	1 part in 4, nearly.	

Dose.—10 to 60 grs.

Incompatibles.—Acids and acidulous salts.

Calcis Phosphas.

Phosphate of Lime.

$Ca_3 P_2 O_8$.

Characters and Tests.—A light white amorphous powder, insoluble in water, but soluble without effervescence in diluted nitric acid; the solution continues clear when an excess of acetate of soda is added to it, but lets fall a white precipitate on the subsequent addition either of a little oxalate of ammonia or of perchloride of iron. Ten grains dissolve perfectly and without effervescence in diluted hydrochloric acid, and the solution yields with ammonia a white precipitate, insoluble in boiling solution of potash, and weighing ten grains when washed and dried.

Preparation.—Pulvis Antimonialis, 2 parts in 3.

Action.—Recommended for rickets, scrofula, mollites ossium, &c.

Dose.—10 to 20 grs.

Calcis Hypophosphis.

Hypophosphite of Lime.

$$Ca\ 2\ P\ H_2\ O_2.$$

Characters and Tests.—A white crystalline salt, with a pearly lustre, and a bitter nauseous taste. Insoluble in rectified spirit. Soluble in six parts of cold water, and only slightly more soluble in hot water. The crystals do not lose water when heated to 300°. Heated to redness they ignite, evolving spontaneously inflammable phosphuretted hydrogen, and leaving a reddish coloured residue amounting to about 80 per cent. of the salt.

Action.—Tonic; alterative and nervine stimulant, and used in phthisis.

Dose.—5 to 10 grs.

Os Ustum.

Bone Ash.

The residue of bones which have been burned to a white ash in contact with air. Consists chiefly of phosphate of lime, with some carbonate of lime, &c.

Preparations in which Bone ash is used.

Calcis Phosphas | Sodæ Phosphas.

Calcii Chloridum.

Chloride of Calcium.

$$Ca\ Cl_2.$$

Characters and Tests.—In white agglutinated masses, dry, but very deliquescent, evolves no chlorine or hypochlorous acid on the addition of hydrochloric acid, and is entirely soluble in twice its weight of water, also in alcohol. The aqueous solution is not precipitated by the addition of lime water.

Action.—Said to be alterative and deobstruent, and used in scrofula and phthisis. Stimulates the lymphatics.

Dose.—10 to 20 grs.

MAGNESIUM. Mg. 24.

133. A greyish white or silvery metal, ductile, malleable and fusible at a red heat. When ignited it burns in air with a very brilliant white light.

MAGNESIA.

Magnesia.

Mg O.

Characters and Tests.—A white powder, insoluble in water, but readily dissolved by acids without effervescence. Its solution in hydrochloric acid, when neutralised by a mixed solution of ammonia and chloride of ammonium, gives a copious crystalline precipitate when phosphate of soda is added to it. Dissolved in nitric acid, and neutralised with a mixture of ammonia and chloride of ammonium, it does not give any precipitate with oxalate of ammonia, or chloride of barium.

Preparations of Magnesia and its Compounds.

Enema Magnesiæ Sulphatis ...	1 ounce sulphate in 16 fluid ounces.
Liquor Magnesiæ Carbonatis ...	13 grains carbonate in 1 fluid ounce.
Magnesia; Magnesia Levis.	
Magnesiæ Carbonas; Magnesiæ Carbonas Levis.	
,, Sulphas.	
Mistura Sennæ composita. ...	1 ounce sulphate in 5 fluid ounces.
Pulvis Rhei compositus	... 6 parts in 9.

Action.—Antacid, alterative and laxative. Used chiefly for acidity of the digestive organs, for dyspepsia and in vomiting.

Dose.—10 to 60 grs.

Incompatibles.—All acids, metallic salts, lime water and alum.

MAGNESIA LEVIS.

Light Magnesia.

Mg O.

Characters.—A bulky white powder differing from the preceding

preparation only in its greater levity, the volumes corresponding to the same weight being to each other in the ratio of three and a half to one.

Preparation.—Pulvis Rhei compositus, 6 parts in 9.

Action.—Same as Magnesia.

Dose.—10 to 60 grs.

MAGNESIÆ CARBONAS.

Carbonate of Magnesia.

$$(Mg CO_3)_3 . Mg O . 5 H_2 O.$$

Characters and Tests.—A white granular powder, which dissolves with effervescence in the diluted mineral acids, yielding solutions which, when first treated with chloride of ammonium, are not disturbed by the addition of an excess of solution of ammonia, but yield a copious crystalline precipitate upon the addition of phosphate of soda. With excess of hydrochloric acid it forms a clear solution in which chloride of barium causes no precipitate. Another portion of the solution supersaturated with ammonia gives no precipitate with oxalic acid or sulphuretted hydrogen. Fifty grains calcined at a red heat are reduced to twenty-two.

Preparations containing Carbonate of Magnesia.

Liquor Magnesiæ Carbonatis ... 13 grains in 1 fluid ounce.
Trochisci Bismuthi... $2\frac{1}{2}$ grains in each lozenge, nearly.
Liquor Magnesiæ Citratis.

Action.—Antacid and laxative. Gives off Carbonic acid gas in the stomach and therefore apt to cause disagreeable distention.

Dose.—10 to 20 grs. as an antacid 40 to 60 as a laxative.

MAGNESIÆ CARBONAS LEVIS.

Light Carbonate of Magnesia.

$$(Mg CO_3)_3 . Mg O . 5 H_2 O.$$

Characters—A very light powder, which, when examined under the microscope, is found to be partly amorphous with numerous slender prisms intermixed. The other characters and tests are the same as those of carbonate of magnesia.

Action.—Like the other Carbonate.

Dose.—10 to 20 grs. as an antacid, 40 to 60 grs. as a laxative.

MAGNESIÆ SULPHAS.

Sulphate of Magnesia.

$Mg\,SO_4.\,7\,H_2O$.

Characters and Texts.—In minute colourless and transparent rhombic prisms, possessing a bitter taste. It readily dissolves in water, and the solution gives copious white precipitates with chloride of barium, and with a mixed solution of ammonia, chloride of ammonium, and phosphate of soda. Its aqueous solution at ordinary temperatures is not precipitated by oxalate of ammonia. Nor should it give a brown precipitate with chlorinated lime or soda. The precipitate given by carbonate of soda, when obtained from a boiling solution of one hundred grains of the salt, should, when well washed, dried and heated to redness, weigh 16·26 grains.

Preparations.

Enema Magnesiæ sulphatis	...1 ounce in	16	fluid ounces.
Mistura Sennæ composita	...1 „	5	„.

Action.—The well known *Epsom salt.* An active cooling cathartic, but must be used with caution in Europeans debilitated by climate. Used in poisoning by lead and baryta.

Dose.—60 grs. to ½ ounce.

Incompatibles.—Alkalis and their Carbonates, Lime water, Acetate of lead and Nitrate of silver.

III.—Metals of the Earths Proper.

ALUMINIUM Al. 27. 5.

134. A brilliant white, silver like metal, unchanged in dry but tarnishing in moist air.

ALUMEN.

Alum.

$NH_4\,Al\,(SO_4)_2.\,12\,H_2O$.

Syn.—Hind. Phitkari; *Dak.* Phatakri; *Tam.* Patikaram; *Tel.* Pati-karam; *Can.* Pati-kara; *Beng.* Phitkiri.

Characters and Tests.—In colourless transparent crystalline masses, exhibiting the faces of the regular octahedron, and having an acid sweetish astringent taste. Its aqueous solution gives with caustic potash or soda a white precipitate soluble in an excess of the reagent,

and the mixture evolves ammonia especially when heated. The aqueous solution gives an immediate precipitate with chloride of barium; it does not acquire a blue colour from the addition of yellow or red prussiate of potash.

Preparation.

Alumen exsiccatum.

Action.—Astringent and styptic: applied locally to arrest hæmorrhage from leech bites, &c., and as a gargle for relaxed sore-throat, &c. Given internally to arrest hæmorrhage from the uterus or bladder, and for hæmoptysis and hæmatemesis. Also prescribed in hooping-cough, and in chronic diarrhœa and dysentery.

Dose.—10 to 20 grs.; in large doses emetic.

Incompatibles.—Alkalis and their carbonates, vegetable astringents, and preparations of lead and mercury.

Alumen Exsiccatum.

Dried Alum.

Alum loses 47 per cent. of its weight by the process of exsiccation.

Action.—More astringent than alum; used only externally for fungous granulations, unhealthy ulcers, chilblains, &c.

CERIUM Ce 92.

135. Named after the planet *Ceres*. It occurs in the mineral *cerite* but its properties have not been well defined.

Cerii Oxalas.

Oxalate of Cerium.

$$Ce\,C_2\,O_4.\ 3\,H_2\,O.$$

Characters and Tests.—A white granular powder, insoluble in water, decomposed at a dull red heat into a reddish-brown powder which dissolves completely and without effervescence in boiling hydrochloric acid, and the resulting solution gives with solution of sulphate of potash a white crystalline precipitate. If the salt be boiled with solution of potash and filtered, the filtrate is not affected by solution of chloride of ammonium, but when supersaturated with

acetic acid it gives with chloride of calcium a white precipitate, which is soluble in hydrochloric acid. Ten grains, when incinerated, lose 5·2 grains in weight.

Action.—Sedative, was introduced, by Sir J. Y. Simpson, as a remedy for vomiting, more particularly in the earlier stages of pregnancy. It has also been recommended for chorea and epilepsy.

Dose.—1 or 2 gr. in pill.

IV.—Metals Proper.

ZINCUM, Zn. 65.

136. A bluish-white metal which slowly tarnishes in the air, forming a film of oxide which prevents further oxidation. Malleable, and when rubbed with the fingers emits a peculiar smell; at 773° Fhr. it melts, and at a bright red heat is volatile.

Zincum Granulatum.

Granulated Zinc.

Preparations.—Liquor zinci chloridi; Zinci chloridum; Zinci sulphas.

Action.—Used in making the above named preparations.

Zinci Acetas.

Acetate of Zinc.

$$Zn(C_2H_3O_2)_2.2H_2O.$$

Characters and Tests.—Thin translucent and colourless crystalline plates, of a pearly lustre, with a sharp unpleasant taste; evolving acetic acid when decomposed by sulphuric acid; soluble in water, and the solution precipitated pure white by sulphuretted hydrogen. A dilute watery solution is not affected by chloride of barium or nitrate of silver; and, when slightly acidulated with hydrochloric acid, is not precipitated by sulphuretted hydrogen; after it has been boiled for a few minutes with a little nitric acid, it yields with ammonia a white precipitate entirely soluble without colour in an excess of the reagent.

Action.—Used as a local astringent in ophthalmia, skin-diseases, &c. Emetic but not much used internally.

Dose.—1 to 2 grs. (as a tonic); 10 to 20 grs. (as an emetic).

Zinci Carbonas.

Carbonate of Zinc.

$$Zn\,CO_3\,(Zn\,O)_2.\ 3\,H_2\,O.$$

Characters and Tests.—White, tasteless, inodorous, insoluble in water; soluble, with effervescence and without residue, in diluted nitric acid. This solution is not affected by chloride of barium or nitrate of silver, and gives with carbonate of ammonia a white precipitate entirely soluble without colour in an excess of the reagent, forming a solution which is precipitated white by sulphide of ammonium.

Preparations.—Zinci Acetas; Zinci Oxidum.

Action.—Chiefly used as an astringent application to ulcers, skin-diseases, &c.

Zinci Chloridum.

Chloride of Zinc.

$$Zn\,Cl_2.$$

Characters and Tests.—Colourless opaque rods or tablets, very deliquescent and caustic; soluble almost entirely in water, alcohol, and ether. The watery solution is precipitated white by sulphide of ammonium and nitrate of silver; but, if first acidulated with hydrochloric acid, it is not affected by sulphuretted hydrogen. Its watery solution is not affected by chloride of barium or oxalate of ammonia, and is not tinged blue by yellow or red prussiate of potash. Ammonia throws down a white precipitate entirely soluble in an excess of the reagent.

Preparation containing Chloride of Zinc.

Liquor Zinci Chloridi ... 366 grains in 1 fluid ounce.

Action.—Chiefly used as an escharotic and disinfectant, and a solution of it has long been known as *Burnett's Disinfecting-fluid.* When used as a caustic it burns deeply and causes great pain, and the neighbouring parts should be protected by adhesive plaster. For use in this way it is made into a paste with plaster of Paris or flour. When removed, a poultice should be applied. It is used as an escharotic for cancer, morbid growths, lupus, &c. In case of poisoning by chloride of zinc, the remedies are carbonate of soda and emetics. It is a very useful disinfectant.

ZINCI OXIDUM.

Oxide of Zinc.

ZnO.

Characters and Tests.—A soft nearly white tasteless and inodorous powder, becoming pale-yellow when heated. Dissolves without effervescence in diluted nitric acid, forming a solution, which is not affected by chloride of barium or nitrate of silver, and gives with carbonate of ammonia a white precipitate which dissolves entirely without colour in an excess of the reagent, forming a solution which is precipitated white by sulphide of ammonium.

Preparation.—Unguentum Zinci, 1 part in $6\frac{1}{2}$, nearly.

Action.—Antispasmodic tonic and astringent. Very useful as a local application for *chafing* in children or adults, and in slight excoriations and ulcerations. The ointment is useful in eczematous or impetiginous skin disease. Internally it has been used in epilepsy, chorea, &c.

Dose.—2 to 10 grs.

ZINCI SULPHAS.

Sulphate of Zinc.

$ZnSO_4 . 7H_2O$.

Syn.—*Hind.* Sufed-thuthah; *Dak.* Sufed-tutta; *Tam.* Vellai-tuttam; *Tel.* Palu-tuttam; *Can.* Bile-tutya.

Characters and Tests.—In colourless transparent prismatic crystals with a strong metallic styptic taste. Its solution in water gives white precipitates with chloride of barium and sulphide of ammonium. Its watery solution is not tinged purple by tincture of galls; and when acidulated with sulphuric or hydrochloric acid, gives no precipitate with sulphuretted hydrogen. After it has been boiled for a few minutes, with a little nitric acid, it yields with ammonia a white precipitate which is entirely soluble without colour in an excess of the reagent.

Preparations.—Zinci Carbonas; Zinci Valerianas.

Action.—In large doses an irritant poison. In moderate dose emetic, and useful in narcotic and alcoholic poisoning as its action is prompt and not followed by depression. In

small doses a nervine tonic and antispasmodic. Used in epilepsy, hysteria, chorea, and nervous exhaustion. Locally an admirable astringent, in the form of lotion or collyrium.

Dose.—1 to 3 grs. as a tonic; 10 to 30 grs. as an emetic; and as a lotion 1 to 3 grs. to the ounce of water.

Incompatibles.—Alkalis and their carbonates, nitrate of silver, acetate of lead and astringent vegetable preparations.

ZINCI VALERIANAS.

Valerianate of Zinc.

$$Zn(C_5H_9O_2)_2.$$

Characters and Tests.—In brilliant white pearly tabular crystals, with a feeble odour of valerianic acid, and a metallic taste; scarcely soluble in cold water or in ether, soluble in hot water and alcohol. Heated to redness in an open crucible it leaves a residue which, when dissolved in diluted sulphuric acid, yields with ammonia a precipitate which entirely dissolves in an excess of the reagent, and the resulting solution gives a white precipitate with sulphide of ammonium. Its solution in hot water is not precipitated by chloride of barium. It gives when heated with diluted sulphuric acid a distillate, which when mixed with the solution of acetate of copper, does not immediately affect the transparency of the fluid, but forms after a little time oily drops, which gradually pass into a bluish-white crystalline deposit.

Action.—A nervine tonic, often useful in hysteria and other affections of the nervous system. Also given for neuralgia in nervous subjects.

Dose.—1 to 3 grs.

FERRUM Fe. 56.

Iron.

137. Got from native carbonates and oxides, and also exists in organic structures. When polished it has a white colour and metallic lustre. Malleable; rapidly oxidises in moist air. In pharmacy wrought iron, in the form of wire or nails free from oxide, is used.

Preparations of Iron.

Emplastrum Ferri.
Ferri Arsenias.
,, Carbonas Saccharata.
,, et Ammoniæ Citras.
,, et Quiniæ ,,
,, Iodidum.
,, Oxidum Magneticum.
,, Peroxidum humidum.
,, Peroxidum hydratum.
,, Phosphas.
,, Sulphas.
,, Sulphas exsiccata.
,, Sulphas granulata.
Ferrum redactum.
,, tartaratum.
Liquor Ferri Perchloridi.
Liquor Ferri Perchloridi fortior.
,, ,, Pernitratis.
,, ,, Persulphatis.
Mistura Ferri aromatica.
,, ,, composita.
Pilula Ferri carbonatis.
,, ,, Iodidi.
Syrupus Ferri Iodidi.
,, ,, Phosphatis.
Tinctura Ferri Acetatis.
,, ,, Perchloridi.
Trochisci Ferri Redacti.
Vinum Ferri.
,, Ferri Citratis.

Ferri Carbonas Saccharata.

Saccharated Carbonate of Iron.

Carbonate of iron, Fe. CO_3, mixed with peroxide of iron and sugar, the carbonate forming at least 317 per cent. of the mixture.

Character and Tests.—Small coherent lumps of a grey colour with a sweet very feeble chalybeate taste. It dissolves with effervescence in warm hydrochloric acid diluted with half its volume of water, and the solution gives but a very slight precipitate with chloride of barium. Twenty grains, dissolved in excess of hydrochloric acid and diluted with water, continue to give a blue precipitate with the red prussiate of potash, until at least 330 grain-measures of the volumetric solution of bichromate of potash have been added.

Preparation.—Pilula Ferri Carbonatis, 1 part in $1\frac{1}{4}$.

Action.—A non-astringent chalybeate, and useful tonic.

Dose.—5 to 20 grs.

Incompatibles.—Vegetable astringents, and acids.

Ferri et Ammoniæ Citras.

Citrate of Iron and Ammonia.

Synonym.—Ferri Ammonio-citras, *Lond.*, *Dubl.*

Characters and Tests.—In thin transparent scales of a deep red colour, slightly sweetish and astringent in taste. It feebly reddens litmus paper, is soluble in water, but almost insoluble in rectified spirit. Heated with solution of potash it evolves ammonia and deposits peroxide of iron. The alkaline solution from which the iron has separated does not, when slightly supersaturated with acetic acid, give any crystalline deposit. When incinerated with exposure to air it leaves not less than twenty-seven per cent. of peroxide of iron which is not alkaline to litmus.

Preparation.

Vinum Ferri Citratis ... 8 grains in 1 fluid ounce.

Action.—A useful tonic for delicate children and females. It is not astringent.

Dose.—5 to 10 grs.

Ferri et Quiniæ Citras.

Citrate of Iron and Quinia.

Characters and Tests.—Thin scales of a greenish golden-yellow colour, somewhat diliquescent, and entirely soluble in cold water. The solution is very slightly acid, and is precipitated reddish-brown by solution of soda, white by solution of ammonia, blue by the yellow and red prussiates of potash, and greyish black by tannic acid. The taste is bitter as well as chalybeate. When burned with exposure to air, it leaves a residue which when moistened with water is not alkaline to test paper. Fifty grains dissolved in a fluid ounce of water and treated with a slight excess of ammonia give a white precipitate, which, when collected on a filter and dried, weighs eight grains. The precipitate is almost entirely soluble in pure ether, and when burned leaves but a minute residue.

Action.—An admirable tonic conjoining the therapeutic properties of iron and quinine.

Dose.—5 to 10 grs.

Incompatibles.—Vegetable astringents, and alkalies.

Ferri Oxidum Magneticum.

Magnetic Oxide of Iron.

Synonym.—Ferri Oxidum Nigrum, *Edin.*

Magnetic oxide of iron, $Fe_3\ O_4$, combined with about 20 per cent. of water of hydration, and containing some peroxide of iron.

Characters and Tests.—Brownish-black, destitute of taste, strongly attracted by the magnet. It dissolves without effervescence in hydrochloric acid diluted with half its volume of water, and the solution thus obtained gives blue precipitates with the red and yellow prussiates of potash. When a small quantity is heated in a dry test tube by the flame of a lamp, a deposit of moisture takes place in the cool part of the tube. Twenty grains dissolved in hydrochloric acid continue to give a blue precipitate with the red prussiate of potash until 83 grain-measures of the volumetric solution of bichromate of potash have been added.

Action.—A non-astringent ferruginous tonic, of good repute as a remedy for neuralgia.

Dose.—5 to 10 grs.

Ferri Peroxidum Humidum.

Moist Peroxide of Iron.

Synonym.—Ferri Peroxidum Hydratum, 1864.

Hydrated peroxide of iron with about 86 per cent. of uncombined water.

Characters and Tests.—A soft moist pasty mass of a reddish-brown colour. Dissolves readily in diluted hydrochloric acid without the aid of heat, and the solution gives a copious blue precipitate with the yellow but not with the red prussiate of potash. A little of it dried at 212°, until it ceases to lose weight, gives off moisture when heated to dull redness in a test tube.

Action.—Used as an antidote for arsenical poisoning. For this purpose it should be freshly made and given in doses of ½ oz. every few minutes, till 12 times the amount of the poison swallowed has been taken. If the prescribed materials for preparing it be not at hand, it may be made by adding the solution or tincture of perchloride of iron to solution of ammonia or potash, and filtering and washing the precipitate. It acts by producing an insoluble subarseniate of protoxide of iron.

Dose.—¼ to ½ oz.

Ferri Peroxidum Hydratum.

Hydrated Peroxide of Iron.

Synonyms.—Ferri Peroxidum, 1864.
Ferri Sesquioxidum, *Lond.*
Ferrugo. } *Edin.*
Ferri Oxidum Rubrum. } *Edin.*

$Fe_2O_3.H_2O$

Characters and Tests.—A reddish brown powder, destitute of taste and not magnetic. It dissolves completely, though slowly, with the aid of heat, in hydrochloric acid, diluted with half its volume of water, and the solution gives a copious precipitate with the yellow, but none with the red prussiate of potash. Heated to dull redness in a test tube it gives off moisture.

Preparation.

Emplastrum ferri.

Action.—Used as nervine tonic in neuralgia and tic douloureux. The plaster is useful in lumbago, sprains and rheumatic pains.

Dose.—5 to 30 grs.

FERRI PHOSPHAS.

Phosphate of Iron.

Phosphate of Iron, $Fe_3P_2O_8$ partially oxidated.

Characters and Tests.—A slate-blue amorphous powder, insoluble in water, soluble in hydrochloric acid. The solution yields a precipitate with both the yellow and red prussiate of potash, that afforded by the latter being the more abundant; and when treated with tartaric acid and an excess of ammonia, and subsequently with the solution of ammonio-sulphate of magnesia, lets fall a crystalline precipitate. When the salt is digested in hydrochloric acid with a lamina of pure copper, a dark deposit does not form on the metal. 20 grains, dissolved in hydrochloric acid, continue to give a blue precipitate with red prussiate of potash until 250 grain-measures of the volumetric solution of bichromate of potash have been added.

Preparation containing Phosphate of Iron.

Syrupus Ferri Phosphatis ... 1 grain in 1 fluid drachm.

Action.—A useful nervine tonic in nervous exhaustion, anæmia, &c. Also used in amenorrhœa. *Easton's Syrup* of phosphate of iron, quinine and strychnia is a well known tonic in hospital and private practice; and "*Parrish's Chemical food* contains phosphate of iron and lime, besides potash and soda.

Dose.—5 to 10 grs.

Ferri Sulphas.

Sulphate of Iron.

$$Fe\,SO_4.\ 7\ H_2O.$$

Syn.—Hind. Hira-kasis ; *Dak.* Hira-kashish ; *Tam.* Anna-bedi ; *Tel.* Anna-bhedi ; *Can.* Anna-bhedi ; *Beng.* Hira-kos.

Characters and Tests.—In obliqne rhombic prisms of a pale greenish blue colour and styptic taste : insoluble in rectified spirit, soluble in water. The aqueous solution is clear, gives a white precipitate with chloride of barium, a blue one with the red, and a nearly white or light blue one with the yellow prussiate of potash. It gives no precipitate with sulphuretted hydrogen.

Preparations.

Ferri Sulphas exsiccata. Pilula Aloes et Ferri... 1 part in 7.

Action.—Astringent and tonic.

Dose.—3 to 5 grs. in pill.

Ferri Sulphas Exsiccata.

Dried Sulphate of Iron.

$$Fe\,SO_4.\ H_2O.$$

Action.—The sulphate loses 6 of its 7 atoms of water by this process, so that 3 grains of the exsiccated are equal to about 5 of ordinary sulphate, medicinally. Action the same as sulphate.

Dose.—$\frac{1}{2}$ to 3 grs.

Ferri Sulphas Granulata.

Granulated Sulphate of Iron.

$$Fe\,SO_4.\ 7\ H_2O.$$

Characters and Tests.—In small granular crystals of a pale greenish blue colour. In other respects corresponds to the characters and tests for sulphate of iron.

Action.—Same as the sulphate.

Dose.—3 to 5 grs.

Ferrum Redactum.

Reduced Iron.

Synonym.—Ferri Pulvis, *Dubl.*

Characters and Tests.—A fine greyish-black powder, strongly attracted by the magnet, and exhibiting metallic streaks when rubbed with firm pressure in a mortar. It dissolves in hydrochloric acid with the evolution of hydrogen, and the solution gives a light-blue precipitate with the yellow prussiate of potash. Ten grains added to an aqueous solution of fifty grains of iodine and fifty grains of iodide of potassium, and digested in a small flask at a gentle heat, leave not more than five grains undissolved, which should be entirely soluble in hydrochloric acid.

Preparation.—Trochisci ferri redacti.

Action.—Consists of pure iron with a variable amount of magnetic oxide. It is soluble in the gastric juice, and forms an admirable ferruginous tonic free from astringency. It may be given in pills, powder or electuary for anæmia, chlorosis, splenic enlargement, &c.

Dose.—1 to 5 grs.

Ferrum Tartaratum.

Tartarated Iron.

Synonym.—Ferri Potassio-tartras, *Lond.*

Ferrum Tartarizatum, *Edin. Dubl.*

Characters and Tests.—Thin transparent scales of a deep garnet colour, slightly sweetish and astringent in taste, soluble in water and sparingly soluble in spirit. The aqueous solution, when acidulated with hydrochloric acid, gives a copious blue precipitate with the yellow, but none with the red, prussiate of potash. When the salt is boiled with solution of soda, peroxide of iron separates, but no ammonia is evolved, and the filtered solution when slightly acidulated by acetic acid gives, as it cools, a crystalline deposit. By incinerating fifty grains of it at a red heat, washing what is left with distilled water, and again incinerating, a residue of peroxide of iron is obtained, weighing 15 grains.

Action.—Tonic and somewhat astringent, mild in its action.

Dose.—5 to 10 grs.

MANGANESIUM Mn 55.

Manganese.

138. A greyish-white, hard and brittle metal. It oxidises on exposure, and decomposes water appropriating the oxygen and setting free the hydrogen.

MANGANESII OXIDUM NIGRUM.

Black Oxide of Manganese.

$$Mn\,O_2.$$

Characters and Tests.—A heavy black powder, which dissolves almost entirely in hydrochloric acid with evolution of chlorine, and gives off oxygen when heated to redness.

Used for producing chlorine.

CUPRUM Cu. 63·5.

Copper.

139. The only red-coloured metal. It is malleable and ductile, and has a disagreeable taste and smell when rubbed. In dry air it gets covered with a film of suboxide of copper, and in moist air with a green crust, the carbonate. Clean copper vessels may with safety be used for carrying or lifting drinking water, but copper cooking vessels are dangerous, as fatty and acidulous substances dissolve the metal which then gets oxidised and becomes poisonous.

CUPRI SULPHAS.

Sulphate of Copper.

$$Cu\,SO_4.\ 5\ H_2\,O.$$

Syn.—Hind. Nila-tuta; *Dak.* Mor-tutta; *Tam.* Mayil-tuttam; *Tel.* Mayilu-tuttam; *Can.* Mail-tutya.

Characters and Tests.—A blue crystalline salt, in oblique prisms, soluble in water, forming a pale blue solution which strongly reddens litmus. The aqueous solution gives with chloride of barium a white precipitate insoluble in hydrochloric acid, and a maroon-red precipitate with yellow prussiate of potash. If an aqueous solution of the salt be mixed with twice its volume of solution of chlorine, and solution of ammonia be added, the precipitate formed by the first addition of the ammonia will be dissolved by a further and sufficient addition of the alkali, and a violet blue solution will be produced, leaving nothing undissolved.

Action.—In large doses is an irritant poison. Chronic poisoning may occur from the use of copper vessels in preparing food. The symptoms of poisoning are severe gastro-intestinal irritation, emaciation, trembling of the limbs, cramps and a purple line on the gums. In medicinal doses sulphate of copper is astringent, and in sufficient quantity emetic. Externally it is escharotic; and is also used in solution as a lotion or collyrium.

Dose.—As an astringent ¼ to 2 grs.; as an emetic 5 to 10 grs.

Incompatibles.—Alkalies, most astringent vegetables, and iodides.

PLUMBUM Pb. 207.

Lead.

140. A soft blue metal easily scratched, and making a mark on paper. It is malleable, melts at a low heat and becomes covered with oxide on exposure to dry air. If in contact with water (more especially if it is pure) as in water-pipes, it is liable to be oxidised, and to render the water poisonous.

PLUMBI ACETAS.

Acetate of Lead.

$$Pb(C_2H_3O_2)_2 \cdot 3H_2O.$$

Characters and Tests.—In white crystalline masses, slightly efflorescent having an acetous odour, and a sweet astringent taste. Its solution in water slightly reddens litmus, gives a yellow precipitate with iodide of potassium, and is precipitated white by sulphuric acid, acetic acid being set free. Its solution in distilled water is clear, or has only a slight milkiness, which disappears on the addition of acetic acid. Thirty-eight grains dissolved in water require for complete precipitation 200 grain-measures of the volumetric solution of oxalic acid.

Preparations in which Acetate of Lead is used.

Liquor Plumbi Subacetatis	... 5 ounces to 1 pint.
Pilula Plumbi cum Opio	...36 parts in 48.
Suppositoria Plumbi composita	... 6 parts in 30.
Unguentum Plumbi Acetatis	... 1 part in 38.

Action.—When prescribed in solution a little acetic acid must be added, to keep it dissolved. Internally astringent

and sedative, and used in chronic diarrhœa and dysentery. Externally it is astringent and useful in drying up ulcers. It is sometimes used as a collyrium, but is an unsafe application in ulceration of the cornea, as it is apt to form a permanent deposit of oxide in the cicatrix. The chief symptoms of poisoning by lead are colic, constipation, fetid breath and a blue line along the margins of the gums.

Dose.—1 to 4 grs.

Incompatibles.—Tannic acid, and Sulphuric acid.

Plumbi Carbonas.

Carbonate of Lead.

Characters and Tests.—A soft heavy white powder, blackened by sulphuretted hydrogen, insoluble in water, soluble with effervescence in diluted acetic acid without leaving any residue, and forming a solution which is precipitated white by sulphuric acid, and yellow by iodide of potassium. The acetic solution when treated with excess of sulphuretted hydrogen, boiled and filtered, gives no precipitate with oxalate of ammonia.

Preparation.

Unguentum Plumbi Carbonatis ... 1 part in 8.

Action.—Only used externally, and forms an astringent and desiccant for ulcers and sores.

Plumbi Nitras.

Nitrate of Lead.

$$Pb(NO_3)_2.$$

Characters and Tests.—In colourless octahedral crystals which are nearly opaque, permanent in the air, of a sweetish astringent taste, soluble in water and in alcohol. The aqueous solution is precipitated black by sulphuretted hydrogen, white by diluted sulphuric acid, and yellow by iodide of potassium. Added to sulphate of indigo it discharges the colour.

Preparation in which Nitrate of Lead is used.

Plumbi Iodidum.

Action.—Is said to be disinfectant, and is a deodoriser. Is used to prepare iodide of lead.

Plumbi Oxidum.

Oxide of Lead.

Synonym.—Lithargyrum, 1864.

Pb O.

Syn.—*Hind.* and *Dak.* Murdar-sing; *Tam.* Mudar-shingu; *Tel.* Mudar-sing; *Can.* Mudadar-shingi; *Beng.* Murdar-sing.

Characters and Tests.—In heavy scales of a pale brick red colour, completely soluble without effervescence in diluted nitric and acetic acids, either solution, when neutral, giving a copious yellow precipitate with iodide of potassium. Its solution in diluted nitric acid when supersaturated with ammonia and then cleared by filtration, does not exhibit a blue colour.

Preparations in which Oxide of Lead is used.

Emplastrum Cerati Saponis	Liquor Plumbi Subacetatis.
" Plumbi.	Plumbi Acetas.

Preparations containing Lead.

Emplastrum Belladonnæ.	Plumbi Acetas.
" Calefaciens.	" Carbonas.
" Cerati Saponis.	" Iodidum.
" Ferri.	" Nitras.
" Galbani.	Suppositoria Plumbi composita.
" Hydrargyri.	Unguentum Plumbi Acetatis.
" Opii.	" Plumbi Carbonatis.
" Plumbi.	" Plumbi Iodidi.
" Resinæ.	" Plumbi Subacetatis compositum.
" Saponis.	
Liquor Plumbi Subacetatis.	
" " " dilutus.	

Action.—Is used for the preparation of plasters. As a powder it dries up ulcers, but is not a safe application.

ARGENTUM Ag. 108.

Silver.

141. A brilliant white metal, which does not oxidise in air or water, but gets darkened by contact with sulphuretted hydrogen. It is malleable and ductile.

ARGENTUM PURIFICATUM.

Refined Silver.

Pure metallic silver.

Test.—If ammonia be added in excess to a solution of the metal in nitric acid, the resulting fluid exhibits neither colour nor turbidity.

Preparation.—Argenti Nitras.

Action.—Used for making nitrate of silver.

ARGENTI NITRAS.

Nitrate of Silver.

$Ag\ NO_3$.

Characters and Tests.—In colourless tabular crystals, the primary form of which is the right rhombic prism; or in white cylindrical rods; soluble in distilled water and in rectified spirit. The solution gives with hydrochloric acid a curdy white precipitate, which darkens by exposure to light, and is soluble in solution of ammonia. A small fragment heated on charcoal with the blow-pipe, first melts, and then deflagrates, leaving behind a dull white metallic coating. Ten grains dissolved in two fluid drachms of distilled water, give with hydrochloric acid a precipitate, which when washed and thoroughly dried, weighs 8·44 grains. The filtrate when evaporated by a water-bath leaves no residue.

Preparation in which Nitrate of Silver is used.

Argenti Oxidum.

Action.—In large doses an irritant poison. In medicinal doses it is astringent, sedative and antispasmodic, and is given in chronic diarrhœa, dysentery, hooping-cough, epilepsy, gastrodynia, pyrosis, ulceration of the stomach, &c. If continued for some time it produces a permanent bluish discoloration of the skin, the approach of which is indicated by the appearance of a dark line along the edge of the gums. Applied externally it is vesicant and caustic. In solution it is used as a collyrium, as an injection in urethral and vaginal complaints, &c.

Dose.—$\frac{1}{6}$ to $\frac{1}{3}$ gr. internally; 2 or 3 grs. to the ounce of water as a lotion, &c.

ARGENTI OXIDUM.

Oxide of Silver.

Ag_2O.

Characters and Tests.—An olive-brown powder, which at a low red heat gives off oxygen, and is reduced to the metallic state. It dissolves completely in nitric acid without the evolution of any gas, forming a solution which has the characters of nitrate of silver. Twenty-nine grains heated to redness leave 27 grains of metallic silver.

Action.—Astringent and is said not to discolour the skin. It is not caustic, but otherwise resembles the nitrate of silver in its action.

Dose.—$\frac{1}{2}$ to 2 grs. in pill.

HYDRARGYRUM.

Mercury.

Syn.—*Hind.* and *Dak.* Para; *Tam.* Irasham; *Tel.* Rasam; *Can.* Pada-rasa; *Beng.* Para.

142. *Characters and Tests.*—A metal, fluid at common temperatures, brilliantly lustrous, and easily divisible into spherical globules. Volatilises at a heat below that of visible redness, leaving no residue.

Preparations containing mercury chiefly uncombined.

Hydrargyrum cum Creta ...	...1 part in 3.
Emplastrum Ammoniaci cum Hydrargyro	...1 " in 5.
" Hydrargyri ...	...1 " in 3.
Linimentum "	...1 " in 3.
Pilula Hydrargyri	...1 " in 3.
Suppositoria Hydrargyri.	
Unguentum "	...1 " in 2.
" " composita	...1 " in $4\frac{1}{2}$.

Preparations containing combined Mercury.

Hydrargyri Iodidum rubrum.
" " viride.
" Oxidum rubrum.
" Perchloridum.
" Subchloridum.
" Sulphas.

Hydrargyrum Ammoniatum.
Liquor Hydrargyri Nitratis acidus.
„ „ Perchloridi.
Lotio Hydrargyri Flava.
Lotio Hydrargyri Nigra.
Pilula Hydrargyri subchloridi composita.
Unguentum Hydrargyri Ammoniati.
„ „ Iodidi rubri.
„ „ Nitratis.
„ „ Oxidi rubri.

HYDRARGYRI OXIDUM FLAVUM.

Yellow Oxide of Mercury.

Hg O.

Characters and Tests.—A yellow powder readily dissolved by hydrochloric acid, yielding a solution which, with solution of ammonia, gives a white precipitate. It is entirely volatilised when heated to incipient redness, being resolved into oxygen gas and the vapour of mercury.

Action.—Used as an escharotic, and as an application to venereal sores. Is in some respects superior to the red oxide, but is apt to get grey when old.

HYDRARGYRI OXIDUM RUBRUM.

Red Oxide of Mercury.

Synonym.—Hydrargyri Nitrico-oxydum, *Lond.*

Hg O.

Characters and Tests.—An orange red powder readily dissolved by hydrochloric acid, yielding a solution which, with caustic potash added in excess, gives a yellow precipitate, and with solution of ammonia a white precipitate. Entirely volatilised by a heat under redness, being at the same time decomposed into mercury and oxygen. If this be done in a test tube, no orange vapours are perceived.

Preparation.

Unguentum Hydrargyri Oxidi rubri ... 1 part in 8.

Action.—Used like the yellow oxide in the form of fine powder as an application for specific sores, and unhealthy granulations.

Hydrargyri Perchloridum.

Perchloride of Mercury.

Synonym.—Hydrargyrum Corrosivum Sublimatum, 1864.
Hydrargyri Bichloridum, *Lond.*
Sublimatus Corrosivus, *Edin.*
Sublimatum Corrosivum, *Dubl.*
Corrosive Sublimate.

$$Hg\ Cl_2.$$

Syn.—*Dak.* Shavir; *Tam.* Viram; *Tel.* Viramu.

Characters and Tests.—In heavy colourless masses of prismatic crystals, possessing a highly acrid metallic taste; more soluble in alcohol, and still more so in ether, than in water. Its aqueous solution gives a yellow precipitate with caustic potash, a white precipitate with ammonia, and a curdy white precipitate with nitrate of silver. When heated it sublimes without decomposing, or leaving any residue.

Preparations in which Perchloride of Mercury is used.

Liquor Hydrargyri Perchloridi...$\frac{1}{2}$ grain in 1 fluid ounce.
Lotio Hydrargyri Flava ...18 grains to 10 fluid ounces.

Action.—A powerful corrosive poison in large doses. In medicinal doses it is alterative, and should be given after meals. Useful in various syphilitic diseases. As a local application it is employed in various skin diseases, and in ophthalmia. As an antidote, in case of a poisonous dose being given, white of egg should be administered.

Dose.—$\frac{1}{16}$ to $\frac{1}{8}$ gr.

Hydrargyri Subchloridum.

Subchloride of Mercury.

Synonyms.—Calomelas, 1864, *Edin.*, *Dubl.*
Hydrargyri Chloridum, *Lond.*
Calomel.

$$Hg\ Cl.$$

Syn.—*Dak.* and *Hind.* Ras-Kapur; *Tam.* Puram; *Tel.* Puramu.

Characters and Tests.—A dull-white heavy and nearly tasteless powder, rendered yellowish by trituration in a mortar; insoluble

in water, spirit, or ether. Digested with solution of potash it becomes black; and the clear solution, acidulated with nitric acid, gives a copious white precipitate with nitrate of silver. Contact with hydrocyanic acid also darkens its colour. It is entirely volatilised by a sufficient heat. Warm ether which has been shaken with it in a bottle leaves, on evaporation, no residue.

Preparations in which subchloride of Mercury is used.

Lotio Hydrargyri Nigra ... ... 3 grains to 1 fluid ounce.

Pilula Hydrargyri Subchloridi composita ... ... 1 part in 5.

Unguentum Hydrargyri subchloridi...1 part in $6\frac{1}{2}$, nearly.

Action.—When given in a large dose, or its use continued for some time, it is apt to produce salivation, purging, palsy and erethism. Is purgative in moderate doses, and alterative in small. It is usually combined with other cathartics when given as a purgative, and is useful as an antiphlogistic and for unloading the liver. As an alterative it is employed in syphilis, chronic hepatitis, &c. For syphilitic affections, especially those of the skin, it is often used in the form of *vapor*. It is also used as an ointment, gargle, lotion, &c., in various complaints. The country-made calomel of the bazaar usually contains some corrosive sublimate, and is apt to produce violent salivation.

Dose.—As an alterative 1 to 2 grs.; as a purgative 3 to 8 grs.

Hydrargyri Sulphas.

Sulphate of Mercury.

$Hg\ SO_4$.

Characters.—A white crystalline heavy powder, rendered yellow by affusion of water. Entirely volatilised by heat.

Preparations in which Sulphate of Mercury is used.

Hydrargyri Perchloridum.
„ Subchloridum.

Action.—Used for making the abovenamed preparations.

HYDRARGYRUM AMMONIATUM.

Ammoniated Mercury.

Synonyms.—Hydrargyri Ammonio-Chloridum, *Lond. Dubl.* Hydrargyri Præcipitatum album, *Edin.*

$$NH_2 Hg Cl.$$

Characters and Tests.—An opaque white powder on which cold water, alcohol, and ether have no action. Digested with caustic potash, it evolves ammonia, acquiring a pale yellow colour, and the fluid, filtered and acidulated with nitric acid, gives a white precipitate with nitrate of silver. Boiled with a solution of chloride of tin it becomes grey, and affords globules of metallic mercury. Entirely volatilised at a heat under redness.

Preparation.

Unguentum Hydrargyri Ammoniati ... 1 part in 8.

Action.—Is used only as an external application, chiefly in the form of ointment. Employed in various skin diseases and ophthalmia tarsi, and for the destruction of pediculi, in powder or ointment.

HYDRARGYRUM CUM CRETA.

Mercury with Chalk or Grey Powder.

Characters and Tests.—A powder of a light-grey colour; free from grittiness; insoluble in water; partly dissolved by diluted hydrochloric acid, leaving the Mercury in a finely divided state. The solution formed with hydrochloric acid is not precipitated by the addition of chloride of tin.

Action.—A mild mercurial, and sometimes given as an alterative in syphilis. In combination with rhubarb or carbonate of soda it is often given to children in diarrhœa, or in cases of skin disease caused by indigestion.

Dose.—3 to 8 grs.

BISMUTHUM Bi. 210.

Bismuth.

143. A reddish-white metal, sometimes got in iridescent cubical crystals. In its native state it contains various impurities.

Preparation.—Bismuthum purificatum.

BISMUTHUM PURIFICATUM.

Purified Bismuth.

A crystalline metal of a greyish-white colour, with a distinct roseate tinge.

Preparations containing Bismuth.

Bismuthi carbonas.	Liquor Bismuthi et ammoniæ.
,, subnitras.	citratis.

Trochisci Bismuthi.

BISMUTHI CARBONAS.

Carbonate of Bismuth.

$$2\,(Bi_2\,CO_5)\cdot H_2\,O.$$

Characters and Tests.—A white powder, blackened by sulphuretted hydrogen; insoluble in water, but soluble with effervescence in nitric acid. When added to sulphuric acid coloured with sulphate of indigo the colour of the latter is not discharged. If to nitric acid mixed with half its volume of distilled water as much carbonate of bismuth be added as the acid will dissolve, one volume of this solution poured into twenty volumes of water will yield a white precipitate. The nitric acid solution gives no precipitate with diluted sulphuric acid or with solution of nitrate of silver.

Action—Is sedative and astringent, and given to check irritability of stomach, purging, pyrosis, &c. Useful in certain forms of dyspepsia. More soluble in the stomach than the subnitrate.

Dose.—5 to 20 grs.

BISMUTHI SUBNITRAS.

Subnitrate of Bismuth.

$$Bi\,NO_4\cdot H_2\,O.$$

Synonyms.—Bismuthum Album, 1864.
Bismuthi Nitras, *Lond.*

Characters and Tests.—A heavy white powder in minute crystalline scales, blackened by sulphuretted hydrogen; insoluble in water, but soluble in nitric acid mixed with half its volume of distilled water, forming a solution which poured into water gives a white precipitate. It forms with sulphuric acid diluted with an equal

bulk of water a solution which is blackened by sulphate of iron. The nitric acid solution gives no precipitate with diluted sulphuric acid nor with solution of nitrate of silver.

Preparation.—Trochisci Bismuthi, 2 grains in each lozenge.

Action.—A most useful sedative and astringent, and used in pyrosis, vomiting, diarrhœa and dyspepsia. Also employed as an injection in leucorrhœa, and gleet, and as a dusting powder in skin diseases, abrasions, and chapped nippes. It is used as a cosmetic but gets blackened in foul air. When given in mixture it should be suspended in mucilage.

Dose.—5 to 15 grs.

Bismuthi Oxidum.

Oxide of Bismuth.

$Bi_2 O_3$.

Characters and Tests.—A dull lemon-yellow powder. Heated to incipient redness it is not diminished in weight. It is insoluble in water, but soluble in nitric acid mixed with half its volume of water, and if it be thus dissolved to saturation, the solution mixed with ten or twenty times its volume of water yields a white precipitate. The nitric acid solution gives no precipitate with diluted sulphuric acid, nor with solution of nitrate of silver, dropped into it. Solution of chloride of ammonium added to the nitric acid solution gives a white precipitate, and if this be treated with excess of solution of ammonia, then filtered, and the clear filtrate neutralised with hydrochloric acid, it will not become turbid.

Action.—Similar in action to, and used in the same manner as the sub-nitrate.

Dose.—5 to 15 grs.

CADMIUM Cd. 112.

Cadmium.

144. Resembles tin in most of its properties, and is found in various zinc ores. The only preparations are the *Iodide of Cadmium* and its ointment, which have already been described (see pages 106 and 128).

STIBIUM Sb. 122.

Antimony.

145. A silvery-white metal, which is brittle and crystalline. It is rarely found native, but generally in the form of the black sulphuret, the *stibium* of the ancients.

ANTIMONII OXIDUM.

Oxide of Antimony.

$Sb_2 O_3$.

Characters and Tests.—A greyish-white powder, fusible at a low red heat, insoluble in water, but readily dissolved by hydrochloric acid. The solution, dropped into distilled water, gives a white deposit, at once changed to orange by sulphuretted hydrogen. It dissolves entirely when boiled with an excess of the acid tartrate of potash.

Preparations in which Oxide of Antimony is used.

Antimonium Tartaratum.
Pulvis Antimonialis ... 1 part in 3.

Preparations containing Antimony.

Antimonii Oxidum.
Antimonium Nigrum.
" Sulphuratum.
" Tartaratum.
Liquor Antimonii Chloridi.
Pilula Hydrargyri Subchloridi Composita.
Pulvis Antimonialis.
Unguentum Antimonii Tartarati.
Vinum Antimoniale.

Action.—Diaphoretic.

Dose.—1 to 4 grs.

PULVIS ANTIMONIALIS.

Antimonial Powder.

Introduced into the pharmacopœia as a substitute for empirical *James's powder*; (see page 89).

Action.—An useful diaphoretic but not quite so certain in its action as *James's powder.*

Dose.—3 to 10 grs.

ANTIMONIUM NIGRUM.

Black Antimony.

Synonym.—Prepared sulphuret of Antimony, 1864.

Native sulphide of antimony, $Sb_2 S_3$, purified from siliceous matter by fusion, and afterwards reduced to fine powder.

Characters and Tests.—A greyish-black crystalline powder. It dissolves almost entirely in boiling hydrochloric acid, evolving sulphuretted hydrogen.

Preparations in which Black Antimony is used.

Antimonium Sulphuratum.
Liquor Antimonii Chloridi.

Action.—Only used for making the above named articles and sulphuretted hydrogen.

ANTIMONIUM SULPHURATUM.

Sulphurated Antimony.

Synonyms.—Antimonii Oxysulphuretum, *Lond.*
,, Sulphuretum Aureum, *Edin.*
,, ,, præcipitatum, *Dubl.*

Syn.—*Hind.* and *Dak.* Surmah; *Tam.* Anjanak-kallu; *Tel.* Anjana-rayi; *Can.* Anjena; *Beng.* Surma.

Sulphide of antimony, $Sb_2 S_3$, with a small and variable amount of oxide of antimony, $Sb_2 O_3$.

Characters and Tests.—An orange-red powder, readily dissolved by caustic soda, also by hydrochloric acid with the evolution of sulphuretted hydrogen and the separation of a little sulphur. Boiled in water with acid tartrate of potash, the resulting solution is precipitated orange red with sulphuretted hydrogen. Sixty grains of this preparation, dissolved in hydrochloric acid and dropped into water, give a white precipitate, which, when washed and dried, weighs about 53 grains.

Preparation.

Pilula Hydrargyri Subchloridi composita...1 part in 5.

Action.—Diaphoretic and alterative; but generally given in combination with some other drug, such as calomel. Useful in syphilis, obstinate skin diseases, &c.

Dose.—1 to 5 grs. in pill.

Antimonium Tartaratum.

Tartarated Antimony.

Synonyms.—Antimonii Potassio-Tartras, *Lond.*
Antimonium Tartarizatum, *Edin.* and *Dubl.*
Emetic Tartar.

$$KSb\,C_4\,H_4\,O_7.\;H_2\,O.$$

Characters and Tests.—In colourless transparent crystals exhibiting triangular facets, soluble in water, and less so in proof spirit. It decrepitates and blackens upon the application of heat. Its solution in water gives with hydrochloric acid a white precipitate, soluble in excess, and which is not formed if tartaric acid be previously added. Twenty grains dissolve without residue in a fluid ounce of distilled water at 60°, and the solution gives with sulphuretted hydrogen an orange precipitate which, when washed and dried at 212°, weighs 9·91 grains.

Preparations.

Unguentum Antimonii Tartarati...1 part in 5.
Vinum Antimoniale ... ...2 grs. in 1 fluid ounce.

Action.—Externally the ointment applied to the skin produces a pustular eruption, and is often used as a counter-irritant. Internally in the dose of 1-6 to 1 gr. it is a depressant emetic, and its action is attended primarily with a reduction in the force and frequency of the pulse, and in the number of respirations, to be followed by an increase in the secretions of the mucous surfaces and the skin. In a dose of 1 to 2 grs. it is emetic. It is sometimes given in pneumonia in large doses, and is useful in pleurisy, bronchitis and acute inflammations.

Dose.—As a diaphoretic $\frac{1}{16}$ to $\frac{1}{6}$ gr.; as an emetic 1 to 2 grs.

ARSENICUM As. 75.

Arsenic.

146. A steel-grey metal with brilliant lustre, very brittle and tarnishes on exposure to the air. Sublimes at a temperature below fusing point, and gives off colourless fumes with a garlic-like odour.

Acidum Arseniosum.

Arsenious Acid.

Synonym.—Arsenicum Album, *Edin.*

As_2O_3.

Syn.—*Hind.* and *Dak.* Sufed-sumbul; *Tam.* Vellai-pashanam; *Tel.* Tella-pashanam; *Can.* Vellap-pashanam; *Beng.* Sumbul-khar.

An anhydrous acid, obtained by roasting arsenical ores, and purified by sublimation.

Characters and Tests.—Occurs as a heavy white powder, or in sublimed masses which usually present a stratified appearance caused by the existence of separate layers differing from each other in degrees of opacity. When slowly sublimed in a glass tube it forms minute brilliant and transparent octahedral crystals. It is sparingly soluble in water, and its solution gives with ammonio-nitrate of silver a canary-yellow precipitate insoluble in water, but readily dissolved by ammonia and by nitric acid. Sprinkled on a red-hot coal, it emits an alliaceous odour. It is entirely volatilised at a temperature not exceeding 400°. Four grains of it dissolved in boiling water with eight grains of bicarbonate of soda, discharge the colour of 808 grain-measures of the volumetric solution of iodine.

Preparations in which Arsenious Acid is used.

Liquor Arsenicalis...	...4 grs. in 1 fluid ounce.	
„ Arsenici Hydrochloricus	...4 „ 1 „ „	

Preparations of Arsenic Acid.

Ferri Arsenias.
Sodæ Arsenias.
„ Arseniatis, Liquor.

Action.—Is an irritant poison. In small doses it is alterative, tonic, and antiperiodic, and is used in spasmodic diseases, skin affections, ague, chronic rheumatism, &c. Externally it is employed as a caustic in cancer, lupus exedens, &c., but there is always considerable risk of its being absorbed, and causing dangerous symptoms.

Dose.—$\frac{1}{60}$ to $\frac{1}{12}$ gr. in solution.

Sodæ Arsenias.

Arseniate of Soda.

$Na_2HAsO_4 . 7H_2O$.

Characters and Tests.—In colourless transparent prisms soluble in water; the solution is alkaline, giving white precipitates with chloride of barium, chloride of calcium, and sulphate of zinc, and a

brick-red precipitate with nitrate of silver, all of which are soluble in nitric acid. Heated to 300° it loses 40·38 per cent. of its weight. A watery solution of ten grains of the residue, treated with 53 grain-measures of the volumetric solution of soda, continues to give a precipitate with the volumetric solution of nitrate of silver until 1613 grain-measures of the latter have been added.

Preparation.

Liquor Sodæ Arseniatis, { 6·6 grains or / 4 grains dried } in 1 fluid ounce.

Action.—Useful in skin affections and in ague, and is less apt to cause gastric disturbance than the arsenite of potash.

Dose.—$\frac{1}{16}$ to $\frac{1}{8}$ gr.

Ferri Arsenias.

Arseniate of Iron.

Arseniate of iron, $Fe_3\,As_2\,O_8$, partially oxidised.

Characters and Tests.—A tasteless amorphous powder of a green colour, insoluble in water, but readily dissolved by hydrochloric acid. This solution gives a copious light-blue precipitate with the yellow prussiate of potash, and a still more abundant one of a deeper colour with the red prussiate of potash. A small quantity boiled with an excess of caustic soda and filtered, gives, when exactly neutralised by nitric acid, a brick-red precipitate on the addition of solution of nitrate of silver. The solution in hydrochloric acid when diluted gives no precipitate with chloride of barium. Twenty grains dissolved in an excess of hydrochloric acid diluted with water continue to give a blue precipitate with the red prussiate of potash, until at least 170 grain-measures of the volumetric solution of bichromate of potash have been added.

Action.—Alterative and tonic; useful in some skin diseases.

Dose.—$\frac{1}{16}$th to $\frac{1}{2}$ gr. in pill.

II.—VEGETABLE MATERIA MEDICA.*

NATURAL ORDER I. RANUNCULACEÆ.

Crowfoot family.

147. ACONITI FOLIA, and ACONITI RADIX.—The leaves and root of *Aconitum napellus*, a native of Europe and the Himalayas.

Characters.—*Leaves* are palmated, and divided to the petiole into five wedge-shaped lobes, which are again sub-divided into pointed linear segments. *Root.* One to three inches long, not thicker than the finger at the crown; tapering, externally blackish brown, internally whitish. Acrid numbing taste.

Active Principle.—Alkaloid *Aconitia*, a white amorphous powder.

Action.—A narcotico-acrid poison; sedative in medicinal doses.

EXTRACTUM ACONITI.—Brownish colour.

Dose.—1 to 2 grs.

TINCTURA ACONITI.—Faint brown colour, clear, no special smell.

Dose.—5 to 15 minims.

LINIMENTUM ACONITI.—Brownish fluid with a camphoraceous smell.

ACONITIA.—An alkaloid obtained from aconite root, and a most deadly poison.

Characters.—A white, usually amorphous solid, soluble in 150 parts of cold and 50 of hot water, never used internally.

UNGUENTUM ACONITIÆ.—Must not be used on broken skin.

***[N.B.—As all the officinal preparations have already been noticed in Chap. III, only those whose characteristics require special attention will be included here.]**

Cimicifugæ Radix.—Or *Actæa racemosa* root. Short, knotty, branching rhizome, with remains of stems on one side and numerous wiry rootlets on the other, colour blackish brown, smell heavy narcotic, and taste acrid and astringent. Used in the form of tincture of which the dose is 1 to 2 drs.

Action.—Sedative, and has a special action on the uterus. Used in rheumatism, dropsy and chronic bronchial disease.

N. O. II. MENISPERMACEÆ.

The Moon-seed family.

148. **CALUMBÆ RADIX.**—Calumba. The root of *Jateorhiza calumba*, native of E. Africa.

Characters.—Round slices, depressed in the centre, and about 2 inches in diameter, of a greyish-yellow colour and bitter taste. Cold decoction is blackened by solution of iodine.

Active Principles.—Yellow bitter *Columbin*, and *Berberine* and *Columbic acid.*

Action.—Slightly sedative, and tonic.

EXTRACTUM CALUMBÆ.—Viscid, brown, and very bitter.

Dose.—2 to 10 grs.

TINCTURA CALUMBÆ.—Orange yellow and bitter.

Dose.—$\frac{1}{2}$ to 2 drs.

INFUSUM CALUMBÆ.—Bitter, yellowish brown.

Dose.—1 to 2 oz.

PAREIRÆ RADIX.—Pareira root. The root of *Chondodendron tomentosum* from Peru and Brazil.

Cylindrical or compressed pieces entire or split, with wrinkled greyish brown bark, crossed transversely by annular elevations. Interior woody, porous, yellowish-grey, with concentric rings and medullary rays. Taste first sweetish and aromatic, afterwards very bitter.

Active Principle.—Probably *Buxine* (*Pelosine*) which has the chemical properties of *Bibirine.*

Action.—Diuretic, and has, apparently, some specific influence on the mucous membrane of the bladder.

EXTRACTUM PAREIRÆ.—Very dark brown or blackish. Bitter taste.

Dose.—10 to 20 grs.

EXTRACTUM PAREIRÆ LIQUIDUM.—Dark brown thickish fluid with a bitter taste.

Dose.—$\frac{1}{2}$ to 2 drs.

N. O. III. BERBERIDACEÆ.

The Berberry family.

149. PODOPHYLLI RADIX.—Podophyllum. The rhizome of *Podophyllum peltatum*, from North America.

Characters.—In pieces about two lines thick, wrinkled longitudinally, dark reddish brown externally, and whitish within, accompanied with pale brown rootlets. Breaking with short fracture and having a peculiar, rather heavy, smell and a nauseous bitter subacrid taste.

Active Principle.—A brownish *Resin.*

Action.—Cholagogue cathartic.

PODOPHYLLI RESINA—Greenish-brown amorphous powder, with peculiar heavy smell and bitter sub-acrid nauseous taste.

Dose.—$\frac{1}{4}$ to 1 gr.

N. O. IV. PAPAVERACEÆ.

The Poppy family.

150. RHŒADOS PETALA.—Red-poppy. Fresh petals of *Papaver rhœas*, cultivated in England.

Characters.—Scarlet colour and heavy poppy odour.

Action.—Used as a colouring agent.

SYRUPUS RHŒADOS.—Bright red colour.

Dose.—1 dr.

PAPAVERIS CAPSULÆ.—Poppy heads. *Syn.*—*Hind.* and *Dak.* Khash-khash-ke-bonde; *Tam.* Gasha-gasha-tol; *Tel.* Gasa-gasala-tolu. Nearly ripe capsules of *Papaver somniferum*, cultivated in England, India, &c.

Characters.—Globular, 2 or 3 inches in diameter, and crowned by a sessile stellate stigma.

Active Principle.—Opium.

Action.—Sedative and anodyne.

EXTRACTUM PAPAVERIS.—Brownish black or with a reddish tinge. Has a peculiar smell and insipid taste.

Dose.—2 to 5 grs.

SYRUPUS PAPAVERIS.—Thickish fluid of a deep brown colour, and having an opiate smell.

Dose.—1 drachm or more for an adult.

OPIUM.—The inspissated juice, got by incision from the unripe capsules, of *Papaver somniferum*, cultivated in Asia Minor, India and China.

Characters.—Irregular lumps, bricks or balls, externally dark brown, and internally slightly moist and chesnut brown, odour narcotic and aromatic, and taste bitter.

Active Principles.—Morphia, codeia, narcotina, paramorphia, meconin, narcein, opianine, apomorphia.

Action.—First stimulant, and then anodyne, narcotic and antispasmodic. Also astringent.

Dose.—From $\frac{1}{4}$ to 2 grs. for an adult.

CONFECTIO OPII.—Thickish preparation of a dark olive brown colour, and having an aromatic odour.

Dose.—5 to 20 grs.

EXTRACTUM OPII.—Soft extract of a dark brown colour and having the peculiar smell of opium.

Dose.—$\frac{1}{2}$ to 2 grs.

EXTRACTUM OPII LIQUIDUM.—Of a deep brown colour, fluid and having the odour of opium.

Dose.—10 to 40 minims.

PULVIS CRETÆ AROMATICUS CUM OPIO.—An aromatic smelling powder, with a sweetish aromatic taste and of a fawn colour.

Dose.—10 to 40 grs.

PULVIS OPII COMPOSITUS.—A yellowish brown powder having an aromatic odour and taste.

Dose.—2 to 8 grs.

TINCTURA OPII.—Deep brown in stock bottle, light or yellowish brown in small quantity. Smell of opium, and a bitter taste.

Dose.—5 to 40 minims.

TINCTURA OPII AMMONIATA.—Red colour, and having the combined odours of ammonia and anise.

Dose.—$\frac{1}{2}$ to 1 dr.

VINUM OPII.—Deep yellowish brown, and having the smell and taste of opium.

Dose.—10 to 40 minims.

PILULA SAPONIS COMPOSITA.—Of a light brown colour, hardish and friable.

Dose.—3 to 5 grs.

TROCHISCI OPII.—Of a brown colour, and sweetish mucilaginous taste.

Dose.—1 or 2 lozenges.

MORPHIÆ ACETAS.—A white powder, not very soluble in water but readily soluble in spirit.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

LIQUOR MORPHIÆ ACETATIS.—Clear fluid with a slightly spirituous odour and bitterish taste.

Dose.—10 to 60 minims.

MORPHIÆ HYDROCHLORAS.—White, flexible acicular prisms of silky lustre, but often supplied as a slightly greyish powder. Soluble in water and in spirit.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

LIQUOR MORPHIÆ HYDROCHLORATIS.—A colourless fluid smelling of spirit, and having a slightly bitter taste.

Dose.—10 to 60 minims.

N. O. V. CRUCIFERÆ.

Cross-flowers.

151. **ARMORACIÆ RADIX.**—Horse Radish. Fresh root of *Cochlearia armoracia* cultivated in Britain.

Characters.—Long cylindrical fleshy root, half an inch to one inch in diameter, expanding at the crown into several short stems. Internally white, with a pungent smell and taste. The root of the *Murungai* tree forms a perfect substitute for this article.

Active Principle.—An essential oil.

Action.—Stimulant and diuretic.

Spiritus armoraciæ.—A colourless fluid with an aromatic smell, and warm aromatic taste.

Dose.—1 to 2 drs.

SINAPIS.—Mustard. *Syn.—Hind.* and *Dak.* Rai; *Tam.* Kadugu; *Tel.* Avalu; *Can.* Sasave; *Beng.* Rai. Seeds of *Sinapis alba* and *Sinapis nigra*; also the seeds reduced to powder and mixed.

Characters of powder.—Greenish-yellow, of an acrid bitterish oily pungent taste, no smell when dry but a peculiar pungent odour when moist, very irritating to nostrils and eyes.

Active Principle.—*Oleum sinapis* having, in an exaggerated degree, the smell and taste of the powder. Burns the tongue and blisters the skin.

Action.—Externally rubefacient and vesicant; internally in large doses—say a dessert-spoonful—emetic.

Linimentum sinapis compositum.—Mixed smell of mustard and camphor and of a green colour.

N. O. VI. CANELLACEÆ.

Canella family.

152. **CORTEX CANELLÆ ALBÆ.**—Bark of *Canella alba*; from the West Indies.

Characters—Quills or broken pieces, hard, of a yellowish white colour, clove-like odour and acrid taste.

Used for making *Vinum rhei.*

N. O. VII. MALVACEÆ.

The Mallow family.

153. **GOSSYPIUM.**—Cotton. *Syn.—Hind.* and *Dak.* Rui;

Tam. Parutti ; *Tel.* Patti ; *Can.* Hutti ; *Beng.* Kapas. Hairs of seeds of *Gossypium herbaceum*, &c., India and S. America.

Characters.—White flat hairs.

Pyroxylin.—Gun cotton.

Collodium.—Colourless liquid with ethereal odour, drying rapidly on exposure, and leaving a thin transparent film not soluble in water or spirit.

N. O. VIII. STERCULIACEÆ.

154. **OLEUM THEOBROMÆ.**—Concrete oil got by heat and expression, from seeds of *Theobroma cacao*.

Characters.—Consistency of tallow, yellowish colour, chocolate odour, and bland taste. Does not become rancid on exposure, melts at 122° Fhr.

Action.—Emollient, used for making suppositories.

N. O. IX. GUTTIFERÆ.

Gamboge family.

155. **CAMBOGIA.**—Gamboge. *Syn.*—*Hind.* Gota-ganba ; *Dak.* Ausarahe-revan ; *Tam.* Makki ; *Tel.* Revalchini-pal ; Gum-resin from *Garcinia morella* of Siam.

Characters.—Cylindrical pieces. Conchoidal fracture, tawny colour changing to yellow when wetted, and acrid taste.

Active Principle.—A resin.
Action.—Hydragogue cathartic.
Dose.—1 to 4 grs.

Pilula cambogiæ co.—Deep brown colour.
Dose.—5 to 10 grs.

N. O. X. POLYGALACEÆ.

Milk-worts.

156. **SENEGÆ RADIX.**—Root of *Polygala senega* from North America.

Characters.—Knobby root-stock, with branched tap-root about the thickness of a quill, twisted and keeled. Bark yellowish brown, sweetish afterwards pungent. Interior woody, tasteless, inert.

Active Principle.—Polygalic acid.

Action.—Expectorant, stimulant and diuretic.

Dose.—10 to 20 grains in powder.

TINCTURA SENEGÆ.—A brownish tincture with the pungent taste of senega.

Dose.—½ to 2 drs.

KRAMERIÆ RADIX.—Root of *Krameria triandra* from Peru.

Characters.—An inch in diameter, branches numerous, long, brownish red and rough externally, reddish yellow internally, strongly astringent tinging the saliva red.

Active Principle.—Tannin.

Action.—Astringent and tonic.

Dose.—10 to 20 grains of powder.

EXTRACTUM KRAMERIÆ.—A reddish-black extract, with an astringent taste.

Dose.—5 to 20 grs.

TINCTURA KRAMERIÆ.—A deep red tincture, having an astringent taste.

Dose.—1 to 2 drs.

N. O. XI. AURANTIACEÆ.

The Orange family.

157. **AURANTII CORTEX.**—Outer part of rind of *Citrus bigaradia.* S. Europe.

Characters.—Thin, dark orange colour, nearly free from inner white rind, aromatic bitter taste and fragrant odour.

Action.—Tonic, carminative and stomachic.

TINCT. AURANTII.—Smell and taste of orange peel, pale brown in colour.

Dose.—1 to 2 drs.

AURANTII FRUCTUS.—Bitter orange, same source as the aurantii cortex.

TINCTURA AURANTII RECENTIS.—Resembles the ordinary tincture.

Dose.—1 to 2 drs.

SYRUPUS AURANTII.—Hazy straw colour.

Dose.—1 to 2 drs.

AQUA AURANTII FLORIS.—Distilled water of flowers of *Citrus bigaradia* S. Europe, or *Citrus aurantium* India, &c.

Characters.—Nearly colourless, fragrant.

Action.—Flavouring vehicle.

Dose.—$\frac{1}{2}$ to 2 oz.

LIMONIS CORTEX.—Lemon-peel. Outer part of rind of fruit of *Citrus limonum* S. Europe and India.

Characters.—Thin, yellowish, aromatic taste and smell.

Action.—Aromatic.

OLEUM LIMONIS.—Oil of Lemons. Oil expressed or distilled from fresh lemon peel.

Characters.—Pale yellow, fragrant, and warm bitter taste.

Action.—Stimulant and carminative.

Dose.—1 to 4 minims.

LIMONIS SUCCUS.—Lemon juice. Freshly expressed juice of *Citrus limonum*, also of *Citrus bergamia.*

Characters.—Slightly turbid liquid, having a sharp acid taste and grateful odour. Sp. grav. 1·039 and contains about 32·5 gr. of Citric acid in 1 ounce.

Action.—Antiscorbutic and refrigerant.

Dose.—2 drachms to 2 ounces or more.

BELÆ FRUCTUS.—Bael fruit. Dried half-ripe fruit of *Ægle marmelos*, India.

Characters.—Round, much larger than the orange, hard woody rind covered with a smooth brownish or greyish skin, internally 10 to 15 celled, the cells containing seeds, pulp and mucus. Aromatic smell and somewhat aromatic and astringent taste.

EXTRACTUM BELÆ LIQUIDUM.—Brown liquid, with smell of fruit and mawkish astringent taste.

Action.—Tonic and astringent.

Dose.—1 to 2 drs.

ACIDUM CITRICUM.—Citric acid. Crystalline acid made from *Succus limonum.*

Characters.—Colourless crystals, of which the right rhombic prism is the primary form, soluble in water, less so in rectified spirit, and having an agreeable acid taste.

Action.—Antiscorbutic; used for effervescing draughts. The following proportions of acid and alkali form neutral citrates in draughts:—

Acid.		*Alkali.*
14 grains Citric acid	to 20 grs.	Bicarbonate of potash.
17 ,, ,,	,, 20 ,,	,, of soda.
24 ,, ,,	,, 20 ,,	Carbonate of ammonia.

Dose.—10 to 30 grs. of the acid.

N. O. XII. LINACEÆ.

The Linseed family.

158. LINI SEMINA.—Linseed. Seed of *Linum usitatissimum* Europe, India, America.

Characters.—Small, oval, pointed, flat, with acute edges, smooth, shining, brown externally, yellowish white internally, and having a mucilaginous oily taste.

Action.—Emollient, and demulcent.

LINI FARINA.—Linseed meal. The cake of linseed from which the oil has been expressed reduced to powder. Used for making poultice.

N. O. XIII. ZYGOPHYLLACEÆ.

Bean-caper family.

GUAIACI LIGNUM.—Guaiacum wood, known in commerce as *Lignum vitæ.* Wood of *Guaiacum officinale.* Jamaica.

Characters.—Outer wood very pale brown, inner dark greenish brown. In powder or chips.

GUAIACI RESINA.—Guaiacum resin. Resin extracted by heat, or got by natural exudation from the wood.

Characters.—Brownish or greenish brown masses, fracture resinous, translucent at the edges. A spirituous solution strikes a clear blue colour on a fresh cut surface of raw potato.

Action.—Stimulant, diaphoretic and alterative.

Dose.—10 to 30 grs.

TINCTURA GUAIACI AMMONIATA.—Deep reddish brown, having the smell of ammonia, and the combined taste of ammonia and guaiacum. Coats the inside of the bottle.

Dose.—$\frac{1}{2}$ to 1 dr.

N. O. XIV. RUTACEÆ.

The Rue family.

159. **OLEUM RUTÆ.**—Oil of rue. The oil distilled from fresh plant *Ruta graveolens.*

Characters.—Pale yellow colour, disagreeable odour, and bitter acrid taste.

Action.—Stimulant and emmenagogue.

Dose.—2 to 4 minims rubbed up with sugar.

BUCHU FOLIA.—Buchu leaves. Dried leaves of *Barosma betulina* and other species; from Cape of Good Hope.

Characters.—Marked with pellucid dots at the indentations and apex, having a strong peculiar smell and camphoraceous taste.

Action.—Diuretic and diaphoretic, also tonic. Useful in diseases of bladder and urethra.

Dose.—20 to 30 grs.

TINCTURA BUCHU.—Dark greenish-brown and having the taste of buchu.

Dose.—1 to 2 drs.

CUSPARIÆ CORTEX.—Cusparia bark. Bark of *Galipea cusparia* from S. America.

Characters.—Straight pieces, somewhat incurved at sides; epidermis mottled brown or yellowish-grey; inside yellowish brown, flaky; short fracture, and aromatic bitter taste. Inner surface touched with nitric acid, does not become blood-red.

Action.—Tonic and antiperiodic.

Dose.—10 to 40 grs.

N. O. XV. SIMARUBACEÆ.

The Quassia family.

160. QUASSIÆ LIGNUM.—Quassia. Wood of *Picræna excelsa*; from Jamaica.

Characters.—Dense, tough, yellowish white wood, intensely and purely bitter.

Action.—Bitter tonic.

TINCTURA QUASSIÆ.—Slightly yellowish, without smell, bitter.

Dose.—1 to 2 drs.

N. O. XVI. VITACEÆ.

Vine family.

161. UVÆ.—Raisins. Dried ripe fruit of *Vitis vinifera*. Spain.

Characters.—Shrivelled, smooth, compressed, fragrant; and having a sweet pulp.

Action.—Demulcent and nutritious.

VINUM XERICUM.—Sherry, prepared by fermentation of the juice of grapes, the fruit of *Vitis vinifera*. Spain.

Characters.—Pale yellow, or yellowish brown, containing about 17 or 18 per cent. of alcohol, and having an alcoholic taste and peculiar flavour.

Action.—Stimulant, tonic.

Dose.—½ to 2 ounces.

ACIDUM TARTARICUM.—Tartaric acid. Crystalline acid made from acid tartrate of potash, which is got from crude tartar deposited during the fermentation of wine.

Characters.—Colourless crystals of oblique rhombic prismatic form; strongly acid taste and soluble in water and rectified spirit. Acetate of potash added to solution gives a white crystalline precipitate. 75 grs. of tartaric acid require 1,000 gr. measures of volumetrical solution of soda for neutralisation.

Action.—Refrigerant, used for preparing effervescent draughts.

Dose.—10 to 30 grains. Twenty grains of the acid are saturated by 27 grs. of Bicarbonate of potash, or by 22 grs. of Bicarbonate of soda.

N. O. XVII. RHAMNACEÆ.

The Buckthorn family.

162. **RHAMNI SUCCUS.**—Buckthorn juice. Recently expressed juice of *Rhamnus catharticus* England.

SYRUPUS RHAMNI.—Purple red colour, and taste aromatic sweetish, becoming slightly acrid.

Action.—Cathartic.

Dose.—1 dr.

N. O. XVIII. ANACARDIACEÆ.

The Sumach family.

163. **MASTICHE.**—Mastich. Resinous exudation got by incision from stem of *Pistacia lentiscus.* Island of Scio.

Characters.—Small, irregular, yellowish tears; brittle, getting soft when chewed; and having an agreeable aromatic odour.

N. O. XIX. BURSERACEÆ.

The Balsamic family.

164. **MYRRHA.**—Myrrh. Gum resinous exudation from stems of *Balsamodendron myrrha.* Abyssinia and Arabia Felix.

Characters.—Irregular tears, varying in size; somewhat translucent; reddish-yellow or reddish-brown; odour pleasant aromatic; and taste acrid and bitter.

Action.—Stimulant. Expectorant and emmenagogue.

Dose.—10 to 20 grs.

TINCTURA MYRRHÆ.—Reddish-yellow with the peculiar odour and taste of myrrh.

Dose.—$\frac{1}{2}$ to 1 dr.

ELEMI.—A concrete resinous exudation of which the botanical source is uncertain, got from Manilla.

Characters.—Soft, unctuous, adhesive mass becoming harder from age, of a yellowish white colour, and having a fragrant fennel-like odour.

Action.—Stimulant, applied externally and used in the shape of Unguentum elemi which is of a cream-colour.

N. O. XX. LEGUMINOSÆ.

The Pulse family.

165. **ACACIÆ GUMMI.**—Gum acacia. *Syn.*—*Hind.* Babul-ki-gond; *Dak.* Kikarka gond; *Tam.* Velam-pishni; *Tel.* Tumma-banka; *Can.* Gobbali-gondu; *Beng.* Babuler-gun. A gummy exudation from undetermined species of acacia in Africa, and from A. arabica in India.

Characters.—Spheroidal, nearly colourless tears, opaque from cracks. Soluble in water.

Action.—Demulcent and emollient.

COPAIBA.—Copaiva. An oleo-resin from incisions in the bark of *Copaifera multijuga*, from S. America.

Characters.—Fluid, light yellow, transparent, with a peculiar odour and an acrid aromatic taste. Soluble in an equal volume of benzol. Does not become gelatinous after being heated to 270° Fhr. Is not fluorescent.

Active Principle.—The essential oil, oleum copaibæ.

Action.—Stimulant of mucous membranes.

Dose.—$\frac{1}{2}$ to 1 dr.

OLEUM COPAIBÆ.—Pale yellow with the odour and taste of copaiba.

Dose.—5 to 30 minims, in emulsion with gum or yolk of egg.

TAMARINDUS.—Tamarind. The pulp of *Tamarindus indica*, the tamarind tree of India.

Characters.—Brown, sweetish acid pulp, containing fibres and brown shining seeds. A piece of bright iron, left in contact with the pulp for an hour, does not show any deposit of copper.

Action.—Laxative, refrigerant and antiscorbutic. Used in confectio sennæ.

CASSIÆ PULPA.—Cassia pulp. *Syn.*—*Hind.* and *Dak.* Magze amaltas; *Tam.* Shara-konrai-puli; *Tel.* Rela-gozzu. Pulp from the pods of Cassia fistula.

Characters.—Blackish brown, viscid, sweetish taste and sickly odour.

Action.—Laxative, used in Confectio sennæ.

SENNA ALEXANDRINA.—Alexandrian senna. Leaflets of *Cassia lanceolata* and *obovata*, natives of Egypt.

Characters.—Lanceolate or obovate leaflets about 1 inch long, unequally oblique at the base, greyish green, having a peculiar odour and mucilaginous sweetish taste.

SENNA INDICA.—Indian senna. *Syn.*—*Hind.* Sana; *Dak.* Sunna-makki; *Tam.* Shimai-nilavarai; *Tel.* Shurattu-tangedu; *Can.* Nela-avarke-gida; *Beng.* Sona-makki. Leaflets of *Cassia elongata*, cultivated in Tinnevelly.

Characters.—About 2 inches long, lanceolate, acute, unequally oblique at the base, entire, green, odour and taste as in Alexandrian senna.

Active Principle.—A nauseous extractive, soluble in water, but not in strong alcohol.

Action.—Purgative.

Dose.—10 to 30 grs..

CONFECTIO SENNÆ.—Dark green, nearly black, soft mass; having the smell of senna and a sweetish taste.

Dose.—60 to 120 grs.

MISTURA SENNÆ COMPOSITA.—Called "Black-draught." Aromatic odour, dark colour, and disagreeable taste.

Dose.—1 to $1\frac{1}{2}$ oz.

SYRUPUS SENNÆ.—Brownish-red colour, and having the odour and taste of senna.

Dose.—1 to 2 drs.

TINCTURA SENNÆ.—Black, and having the smell and taste of the senna.

Dose.—1 to 4 drs.

BALSAMUM PERUVIANUM.—Balsam of Peru. A balsam got from *Myroxylon pereiræ*, a native of S. America.

Characters.—Reddish brown, or nearly black, liquid, and having the consistence of syrup, a balsamic smell and an acrid slightly bitter taste. Soluble in 5 parts of rectified spirit, but not diminished in volume when mixed with water.

Action.—Stimulant expectorant, also used as a stimulant application to indolent ulcers.

Dose.—10 to 15 minims.

BALSAMUM TOLUTANUM.—Balsam of tolu. A balsam obtained from *Myroxylon toluifera.* It exudes from incisions in the bark, and the tree is a native of New Granada.

Characters.—Soft, tenacious solid, with a fragrant smell and soluble in rectified spirit.

Action.—Stimulant expectorant.

Dose.—10 to 20 grs.

SYRUPUS TOLUTANUS.—Colourless, and having the fragrant odour of tolu, and a sweetish balsamic taste.

Dose.—1 to 2 drs.

TINCTURA TOLATANA.—Light brown.

Dose.—15 to 20 min. suspended in syrup or mucilage.

PTEROCARPI LIGNUM.—Red sandal-wood. The wood of *Pterocarpus santalinus* from Ceylon and India.

Characters.—Dense heavy billets, outwardly dark brown, internally with dark and lighter red rings if cut transversely. Powder blood red, having a faint peculiar smell and a feebly astringent taste. An ingredient of Tinctura lavandulæ co.

KINO.—The inspissated juice got from incisions in the bark of *Pterocarpus marsupium*, a common tree in Malabar forests.

Characters.—Small, angular, glistening, reddish-black, brittle fragments, translucent and ruby-red on the edges. No smell but strong astringent taste. Tinges saliva red.

Active principle.—*Pyrocatechin.*

Action.—Astringent.

Dose.—10 to 30 grs.

TINCTURA KINO.—Blackish red, with an astringent taste.

Dose.—1 to 2 drs.

PULVIS KINO COMPOSITUS.—Reddish-brown with an aromatic and astringent taste.

Dose.—5 to 20 grs.; contains 1 gr. of opium in 20 grs.

HÆMATOXYLI LIGNUM.—Logwood. The heart-wood of *Hœmatoxylon campechianum*, a native of the West Indies.

Characters.—Reddish brown chips, having a faint pleasant smell, and a sweetish taste.

Active principle.—Tannic acid, a resin, and a peculiar azotized colouring substance called *Hœmatoxylin.*

Action.—Astringent, tonic.

EXTRACTUM HÆMATOXYLI.—A dry extract, hard and brittle, of a shining dark brown colour, not translucent.

Dose.—10 to 30 grs.

PHYSOSTIGMATIS FABA.—Calabar bean. The seed of *Physotigma venenosum* from Western Africa.

Characters.—About the size of a very large horse-bean, with a hard shining integument of a brownish-red, pale-chocolate, or ash-grey colour. Inside this is a hard white kernel without bitterness, acrimony, or aromatic flavour, which yields its virtues to alcohol and imperfectly to water.

Action.—Powerful sedative of the spinal nerves, producing paralysis of the lower extremities and death by

asphyxia. In very large doses it causes death by paralysis of the heart. Applied to the eye it produces contraction of the pupil.

Dose.—1 gr. to 4 grs.

EXTRACTUM PHYSOSTIGMATIS.—A soft spirituous extract of a deep brown colour.

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ of grain. For contracting the pupil a minute quantity, in substance or dissolved in glycerine, is applied by means of a camel hair pencil to the eye. Discs of gelatine saturated with a tincture of the bean are now chiefly used, one being sufficient for a single application.

GLYCYRRHIZÆ RADIX.—Liquorice. The root of *Glycyrrhiza glabra*, cultivated in Europe.

Characters.—Long round branched pieces, tough and pliable, greyish brown externally, yellow internally, without smell, and of a sweet mucilaginous taste.

Action.—Demulcent and emollient.

EXTRACTUM GLYCYRRHIZÆ.—In round sticks, of a brownish colour, having an agreeable odour and sweet taste.

TRAGACANTHA.—Tragacanth, a gummy exudation from the stems of *Astragalus verus*, a native of Asia Minor.

Characters.—White or yellowish shell-like curved plates, tough and elastic. Sparingly soluble, but swelling into a mucilaginous mass, in cold water; tinged violet by iodine.

Action.—Emollient and demulcent.

PULVIS TRAGACANTHÆ COMPOSITUS.—White, sweetish powder.

Dose.—10 to 60 grs.

SCOPARII CACUMINA.—Broom-tops. Fresh and dried tops of *Sarothamnus scoparius*, an English shrub.

Characters.—Straight, angular, dark green and smooth twigs, having a bitter nauseous taste and a peculiar smell when bruised.

Active principle.—Neutral principle *Scoparin*, and a volatile liquid alkaloid *Sparteine.*

Action.—Diuretic.

Dose.—20 to 30 grs. in decoction.

SUCCUS SCOPARII.—A dark-brown fluid, having a little of the smell, and the bitter taste, of broom.

Dose.—1 to 2 drs.

GOA POWDER or Araroba powder, is said to be the product of a Leguminous tree, and to contain over 80 per cent. of Chrysophanic acid.

Action.—Used in Ringworm and skin diseases; in the form of ointment made by mixing from 1 to 2 drs. of the powder in an ounce of lard, heated over a water-bath and stirred till cold.

N. O. XXI. ROSACEÆ.

The Rose family.

166. **ROSÆ GALLICÆ PETALA.**—Red-rose petals. The fresh and dried unexpanded petals of *Rosa gallica*, cultivated in Europe.

Characters.—Colour fine purplish red, taste bitterish, feebly acid and astringent; odour roseate, developed by drying.

Action.—Astringent, chiefly used as a vehicle for other medicines on account of colour and flavour.

CONFECTIO ROSÆ GALLICÆ.—Thick, having a sweet taste and dark red colour.

Dose.—Used as an excipient in making pills.

ROSÆ CANINÆ FRUCTUS.—Hips, the ripe fruit of the Dog rose, *Rosa canina*, indigenous in England.

Characters.—An inch or more in length, ovate, scarlet, smooth, shining; taste sweet, subacid.

Action.—Used only for pharmaceutical purposes in the making of pills, &c.

CONFECTIO ROSÆ CANINÆ.—Firm consistence and of a bright red colour.

ROSÆ CENTIFOLIÆ PETALA.—Cabbage-rose petals. The fresh petals fully expanded of *Rosa centifolia*, cultivated in England.

Characters.—Taste sweetish, bitter and faintly astringent; odour roseate.

Action.—Mildly laxative, chiefly used for making Aqua rosæ, an agreeable vehicle for medicines.

CUSSO.—The flowers and tops of *Brayera anthelmintica*, an Abyssinian plant.

Characters.—Flowers small, reddish brown, on hairy stalks; outer limb of calyx 5-parted, segments oblong or oblong lanceolate, reticulated.

Active principle.—Contains a volatile oil, bitter acrid resin, tannin and a crystalline principle named *Kosin.*

Action.—Anthelmintic, given in cases of tape-worm in the shape of infusion followed by a purgative.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ oz.

AMYGDALA AMARA.—Bitter almond. *Syn.*—*Hind.* and *Dak.* Karve-badam; *Tam.* Kashappu-vadam-kottai; *Tel.* Chedubadam-vittulu; *Can.* Tikta-badami. The seed of the bitter almond tree *Amygdalus communis*, var, *amara*, a native of Barbary and Syria.

Characters.—About $\frac{3}{4}$ of an inch in length, lanceolate acute, cinnamon brown colour, bitter taste and when rubbed with water has a characteristic smell.

Action.—Only used for the oil, oleum amygdalæ, which is got by expression.

AMYGDALA DULCIS.—Sweet almond. *Syn.*—*Hind.* and *Dak.* Mithebadam; *Tam.* Tittippuvadam-kottai; *Tel.* Tipubaddam-vittilu; *Can.* Shiyada-badami. Seed of the sweet almond tree, *A. communis* var. *dulcis*, cultivated in the south of Europe.

Characters.—As in the bitter almond except that the seed is narrower and longer, and does not give out the peculiar smell mentioned.

Action.—Emollient and nutritive, yields Almond oil.

LAUROCERASI FOLIA.—Cherry-laurel leaves. The fresh leaves of *Prunus laurocerasus*, cultivated in temperate Europe, and a native of Asia Minor.

Characters.—Ovate-lanceolate or elliptical, distantly toothed, furnished with glands at the base, smooth and shining deep green, on strong short foot-stalks, emitting a ratafia odour when bruised.

Active principle.—A volatile oil containing hydrocyanic acid.

Action.—The Aqua in moderate doses is sedative, in large doses poisonous.

Dose.—Of Aqua laurocerasi 5 to 30 minims.

PRUNUM.—Prune. The dried fruit of the plum, *Prunus domestica*, cultivated in Europe.

Characters.—Ovate, an inch long, black, wrinkled, sweet.

Action.—Demulcent and laxative.

N. O. XXII. MYRTACEÆ.

The Myrtle family.

167. **OLEUM CAJUPUTI.**—Cajuput oil. *Syn.*—*Hind.* and *Dak.* Kai-buti-ka-tel; *Tam.* Kaiyap-pudai-tailam. Distilled from the leaves of *Melaleuca minor*, a native of Singapore and Batavia.

Characters.—Very mobile, transparent, and of a fine pale bluish green colour. Has a strong agreeable odour, and a warm camphoraceous aromatic taste, leaving a coldness in the mouth.

Action.—Stimulant and antispasmodic: externally rubefacient.

Dose.—1 to 5 drops on sugar or in emulsion, an ingredient in Croton liniment and used by itself as a liniment in chronic rheumatism.

CARYOPHYLLUM.—Cloves. *Syn.*—*Hind.* Long; *Dak.* Lavang; *Tam.* Kirambu; *Tel.* Lavangalu; *Can.* Lavanga; *Beng.* Long. The dried unexpanded flowerbuds of *Caryophyllus aromaticus*, cultivated in Penang, Bencoolen and Amboyna.

Characters.—Six lines long, plump, heavy, dark reddish brown, somewhat nail-shaped, with a strong aromatic odour, and a bitter spicy pungent taste. When pressed between the nails of the thumbs emits an oil.

Active principle.—Volatile oil and a resinous crystalline substance *Caryophyllin.*

Action.—Stimulant, aromatic and carminative.

OLEUM CARYOPHYLLI.—Oil of cloves. Colourless when new but gets brown from age, thickish, heavy, and having the smell and taste of cloves very strong. Sinks in water.

Dose.—1 to 4 minims.

PIMENTA.—Pimento. Dried unripe berries of the All-spice, *Eugenia pimenta.* West Indies.

Characters.—Size of a small pea, brown, rough, crowned with the teeth of the calyx, contains 2 dark brown seeds. Odour and taste aromatic, warm and peculiar.

Action.—Carminative.

OLEUM PIMENTÆ.—Oil of pimento. Nearly colourless when new, but getting brown from age, and having the taste and smell of allspice. Sinks in water.

Dose.—1 to 5 minims.

GRANATI RADICIS CORTEX.—Pomegranate root-bark. Dried bark of the root of *Punica granatum* the Pomegranate tree. S. Europe and India.

Characters.—Quills or fragments of a greyish-yellow colour externally, yellow internally, short fracture, little odour and an astringent slightly bitter taste.

Action.—Astringent and anthelmintic.

Dose.—Of the decoction 2 ounces, as an anthelmintic, taken every half hour until 6 doses have been taken.

N. O. XXIII. CUCURBITACEÆ.

Cucumber family.

168. **COLOCYNTHIDIS PULPA.**—Colocynth pulp. Dried decorticated fruit, freed from seeds, of *Citrullus colocynthis,* S. Europe, &c.

Characters.—Light, spongy, white or yellowish white, and intensely bitter in taste.

Active principle.—Resinoid substance *Colocynthin.*

Action.—Active cathartic.

Dose.—2 to 8 grs.

Extractum colocynthidis compositum.—Compound extract of colocynth. Hard, brownish-black mass, having a combined aloetic and aromatic flavour, and bitter taste.

Dose.—3 to 10 grs.

Pilula colocynthidis composita.—Compound pill of colocynth. Soft mass, having the smell of cloves, of a dark brown colour and having a bitter taste.

Dose.—5 to 10 grs.

Elaterium.—A sediment from the juice of the fruit of the squirting cucumber, *Ecbalium officinarum.* Shores of the Mediterranean.

Characters.—Light, friable, slightly incurved, cakes, about 1 line thick, greenish grey, acrid and bitter.

Active principle.—*Elaterin,* which occurs in delicate, satiny, prismatic crystals.

Action.—Violent purgative.

Dose.—$\frac{1}{16}$ to $\frac{1}{2}$ gr.

Pulvis elat, Co. Greyish powder.

Dose.—$\frac{1}{2}$ gr. to 5 grs.

N. O. XXIV. HAMAMELACEÆ.

The Witch-hazel family.

169. **Styrax præparatus.**—Storax. A balsam from the bark of *Liquidambar orientale,* a native of Asia Minor.

Characters.—Semi-transparent, brownish-yellow, and semi-fluid resin, having a strong agreeable smell, and aromatic bland taste. Heated over a vapour bath it becomes more liquid but gives off no moisture. Boiled with solution of bichromate of potash and sulphuric acid, it evolves the odour of hydride of benzoyle.

Active principle.—Contains a crystallisable principle *Styracine,* a volatile oil *Styrol* and *Cinnamic acid.*

Action.—Stimulant and expectorant.

Dose.—5 to 20 grs.

N. O. XXV. UMBELLIFERÆ.

The Umbellate family.

170. **CARUI FRUCTUS.**—Caraway fruit. Dried fruit of *Carum carui*, cultivated in England and Germany.

Characters.—Fruit in two parts, each when separated being about 2 lines long, curved, tapering at the ends, brown, with 5 paler longitudinal ridges. Odour peculiar and aromatic, taste spicy.

Active principle.—A volatile oil.

Action.—Stimulant and carminative.

OLEUM CARUI.—Oil distilled from fruit of *Carum carui.* Pale yellow, odour aromatic, taste warm spicy.

Dose.—2 to 6 drops.

OLEUM ANISI.—Oil of anise.* *Syn.*—*Hind.* and *Dak.* Sonf; *Tam.* Perun-shiragum; *Tel.* Pedda-jilakara; *Can.* Sompu; *Beng.* Mitha-jira. The oil distilled from the fruit of *Pimpinella anisum*, which is cultivated in S. Europe.

Characters.—Pale yellowish, with a peculiar odour, and a sweetish warm taste. Concretes at 50° Fhr.

Action.—Carminative.

Dose.—1 to 15 drops on sugar.

FŒNICULI FRUCTUS.—Fennel fruit. Fruit of *Fœniculum dulce*, imported from Malta.

Characters.—About 3 lines long, elliptical, slightly curved, beaked, having 8 pale-brown longitudinal ribs, the 2 lateral being double; taste and odour aromatic.

Active principle.—A volatile oil.

Action.—Carminative; prescribed in the form of Aqua fœniculi.

ANETHI FRUCTUS.—Dill. *Syn.*—*Hind.* Soya; *Dak.* Soyi; *Tam.* Shatakuppi-virai; *Tel.* Shatakuppi-vittulu; *Can.* Sabbasagi; *Beng.* Shonva. The fruit of the *Anethum graveolens*, cultivated in England, &c.

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* The oil distilled from the Illicium anisatum has all the characteristics of this article, and the young leaves of Feronia elephantum have a very decided smell of anise when bruised, and would likely yield a similar product.

Characters.—Oval, flat, about 1 to $1\frac{1}{2}$ line in length, with pale membranous margin. Smell aromatic, taste warm and somewhat bitter.

Active principle.—A volatile oil.

Action.—Carminative.

OLEUM ANETHI.—Pale-yellow, odour pungent, taste acrid and sweetish.

Dose.—1 to 5 drops.

CORIANDRI FRUCTUS.—*Syn.*—*Hind.* Dhanya; *Dak.* Dhanyan; *Tam.* Kottamalli; *Tel.* Daniyala; *Can.* Kottamari-bija; *Beng.* Dhanya-a. Dried fruit of Coriander, *Coriandrum sativum*; cultivated in Britain, India, &c.

Characters.—Globular, beaked, finely ribbed, yellowish-brown; has an agreeable aromatic odour and flavour.

Active principle.—An essential oil.

Action.—Carminative.

OLEUM CORIANDRI.—Yellowish, and having the peculiar fragrance of the fruit.

Dose.—2 to 5 drops.

ASSAFŒTIDA.—*Syn.*—*Hind.* and *Dak.* Hing; *Tam.* Kayam; *Tel.* Inguva; *Can.* Ingu; *Beng.* Hing. A gum-resin, got by incision from the living root of *Narthex assafœtida.* Affghanistan and Punjab.

Characters.—Irregular masses, partly composed of tears moist or dry, colour of fresh fractures opaque-white, but gradually becomes purplish-pink, and ultimately dull-yellowish or pinkish-brown. Odour fetid, like that of onions and persistent. Taste bitter, acrid. Mostly soluble in rectified spirit.

Active principle.—The smell depends on a volatile oil, but one-half of the article is a resin.

Action.—Antispasmodic and stimulant.

Dose.—5 to 20 grs.

PILULA ASSAFŒTIDÆ COMPOSITA.—Brownish mass, having the smell of assafœtida and an acrid taste.

Dose.—5 to 10 grs.

TINCTURA ASSAFŒTIDÆ.—Has the odour of the drug well marked; reddish-brown colour.

Dose.—½ to 1 dr.

AMMONIACUM.—Gum resinous exudation from *Dorema ammoniacum.* Persia and Punjaub.

Characters.—Tears or masses; the tears of a pale cinnamon-brown colour, hard and brittle when cold, but readily softening with heat. Has a faint odour and a bitter acrid nauseous taste. Forms an emulsion with water.

Active principle.—Resin, gum and volatile oil.

Action.—Stimulant and expectorant; also used in plasters.

Dose.—10 to 20 grs.

MISTURA AMMONIACI.—A milky emulsion having the smell of the drug.

Dose.—½ to 1 oz.

GALBANUM.—Gum-resin, source unknown; imported from India and the Levant.

Characters.—Irregular, usually tears in masses; translucent, greenish-yellow, having a strong disagreeable smell and acrid bitter taste.

Active principle.—Volatile oil and resin.

Action.—Antispasmodic and expectorant.

Dose.—10 to 20 grs.

CONII FOLIA.—Hemlock leaves. Fresh leaves and young branches of *Conium maculatum*, Britain.

Characters.—Fresh leaves decompound, smooth, arising from a smooth stem with dark purple spots; dried leaves green and having a peculiar odour.

Active principle.—A peculiar oily fluid *Conia* or *Conine.*

Action.—Narcotic, anodyne, and antispasmodic. In large doses poisonous.

Dose.—In powder 2 to 8 grs.

EXTRACTUM CONII.—Green; becomes brown.

Dose.—4 to 8 grs.

PILULA CONII COMPOSITA.—Deep olive.

Dose.—5 to 10 grs.

SUCCUS CONII.—Brown.

Dose.—30 to 60 minims.

CONII FRUCTUS.—Hemlock fruit. Dried ripe fruit of same plant as above.

Characters.—Broadly ovate, laterally compressed; half-fruit with 5 waved or crenated ridges. The powder rubbed with solution of potash gives out the odour of conia, a mouse-like smell.

Active principle and *action* as in leaves.

TINCTURA CONII.—Light brown colour, and emitting the peculiar mouse-like smell of conia on the addition of liquor potassæ.

Dose.—20 to 60 minims.

N. O. XXVI. CAPRIFOLIACEÆ.

The Honeysuckle family.

171. **SAMBUCI FLORES.**—Elder Flowers. The fresh flowers of *Sambucus nigra*, England.

Characters.—Flowers small, white, fragrant, in crowded large cymes.

Action.—Used only as an agreeable vehicle for other medicines, in the shape of Aqua sambuci.

N. O. XXVII. RUBIACEÆ.

The Madder family.

172.—**CINCHONÆ FLAVÆ CORTEX.***—Yellow bark. The bark of *Cinchona calisaya* from Bolivia and S. Peru.

Characters.—Flat pieces uncoated, rarely in coated quills, from 6 to 18 in. long, 1 to 3 in. wide, and 2 to 4

* All the more valuable species of Cinchona are now extensively and successfully cultivated on the Neilgherries, Madras, and in Bengal, and Ceylon. In a few years, therefore, these plantations may be expected to yield sufficient bark to meet the requirements of India, and to a large extent of England also.

lines thick, compact and heavy; outer surface brown, inner surface tawny yellow, fibrous; transverse fracture shortly and finely fibrous. Powder cinnamon brown, aromatic and bitter.

Active principle.—The alkaloids *Quinia* and *Cinchonia.*

Action.—Tonic, antiperiodic and astringent.

Dose.—10 to 60 grs. in powder.

Incompatibles.—Lime water; metallic salts; gelatine.

EXTRACTUM CINCHONÆ FLAVÆ LIQUIDUM.—Thickish fluid, of a brown colour in the bottle, having a bitter taste.

Dose.—10 to 30 minims.

TINCTURA CINCHONÆ FLAVÆ.—Brownish-red, and having a bitter taste.

Dose.—½ to 2 drs.

QUINIÆ SULPHAS.*—Silky snow-white crystals, having an intensely bitter taste, sparingly soluble in water but giving it a bluish tint. Readily soluble on the addition of sulphuric or other acid.

Dose.—1 to 10 grs.

Incompatibles.—Astringent infusions; alkalies.

PILULA QUINIÆ.—Reddish colour, and bitter taste.

Dose.—2 to 10 grs.

TINCTURA QUINIÆ.—Orange colour, and aromatic bitter taste.

Dose.—½ to 2 drs.

TINCTURA QUINIÆ AMMONIATA.—Colourless.

Dose.—1 to 2 drs.

CINCHONÆ PALLIDÆ CORTEX.—Pale-cinchona bark. The bark of *Cinchona condaminea.* Loxa in Ecuador.

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* The sulphates of quinidia, cinchonia and cinchonidia have also been extensively used during the last few years in India, and found little, if it all, inferior to quinine. A preparation known as "quinetum" made by Government has also been employed to a considerable extent. It contains the alkaloids, as they exist in the bark, in an uncrystallised state.

Characters.—In single or double quills, 6 to 15 inches long. The bark $\frac{1}{2}$ to 1 line thick, with a short transverse fracture; outer surface brown and wrinkled, or grey and speckled with lichens; inner surface bright orange or cinnamon brown; powder pale brown, slightly bitter, and very astringent.

Dose.—10 to 60 grs.

TINCTURA CINCHONÆ COMPOSITA.—Reddish yellow colour, and aromatic and slightly bitter taste.

Dose.—$\frac{1}{2}$ to 2 drs.

CINCHONA RUBRÆ CORTEX.—Red-cinchona bark. The bark of *Cinchona succirubra*. Slopes of Chimborazo.

Characters.—Flat in curved pieces, sometimes in quills, covered with the periderm, varying in length from a few inches to 2 feet, from 1 to 3 inches wide and 2 to 6 lines thick. Outer surface brown or reddish brown, rarely white from lichens; inner surface redder; fracture brick-red; taste bitter and astringent. Powder red-brown.

Dose.—10 to 60 grs.

IPECACUANHA.—Ipecacuanha. The dried root of *Cephaëlis ipecacuanha*, imported from Brazil.

Characters.—In pieces 3 to 4 inches long, about the thickness of a quill, contorted and irregularly annulated. Colour brown. The outer cortical portion is the active part, the slender woody centre being inert.

Active principle.—*Emetine*, which is alkaline, whitish, inodorous, powdery and of a bitter taste.

Action.—Emetic, diaphoretic, expectorant and having a specific action in dysentery.

Dose.—As an expectorant $\frac{1}{2}$ to 2 grs.; as an emetic and in acute dysentery 15 to 20 or 30 grs.

Incompatibles.—Astringent infusions; salts of lead and vegetable acids.

PULVIS IPECACUANHÆ.—Pale brown with a faint nauseous odour, and a somewhat acrid and bitter taste.

VINUM IPECACUANHÆ.—A vinous smell and very faint odour of the drug, nauseous taste and light reddish colour.

Dose.—As an emetic 3 to 6 drs. for an adult, for a child a tea-spoonful every 15 minutes till vomiting ensues: as an expectorant or diaphoretic from 5 to 40 drops.

PULVIS IPECACUANHÆ CO.—Dover's powder. A brownish grey powder, having the smell of opium and ipecacuanha and a nauseous taste.

Dose.—5 to 15 grs. as a diaphoretic; very useful in small doses in the diarrhœa of children.

PILULA IPECACUANHÆ CUM SCILLA.—Brown.

Dose.—5 to 10 grs.

CATECHU PALLIDUM.—Pale catechu. An extract of the leaves and young shoots of *Uncaria gambir*, cultivated at Singapore, &c.

Characters.—In cubes, or masses formed of coherent cubes; externally brown, internally yellowish or pale brick red with a dull earthy fracture. Taste mucilaginous, astringent and bitter, succeeded by slight sweetness.

Action.—Astringent.

Dose.—10 to 30 grs.

Incompatibles.—Metallic salts and alkalies.

PULVIS CATECHU COMPOSITUS.—Of a reddish brown colour, and having an aromatic odour and astringent and aromatic taste.

Dose.—20 to 40 grs.

TINCTURA CATECHU.—Of a deep brownish colour, and having an astringent taste.

Dose.—½ to 2 drs.

N. O. XXVIII. VALERIANCEÆ.

The Valerian family.

173. **VALERIANÆ RADIX.**—Valerian. Dried root of *Valeriana officinalis* a native of Great Britain.

Characters.—Short yellowish white rhizome, with numerous fibrous roots about 2 or 3 in. long; of a bitterish taste and strong peculiar smell.

Active principle.—Volatile oil and *Valerianic acid.*

Action.—Antispasmodic.

Dose.—Of powder 10 to 30 grs.

TINCTURA VALERIANÆ.—A yellowish brown fluid with the peculiar smell of valerian.

Dose.—1 to 2 drs.

TINCTURA VALERIANÆ AMMONIATA.—A reddish-brown fluid, with the combined odours of valerian and ammonia.

Dose.—$\frac{1}{2}$ to 1 dr.

N. O. XXIX. COMPOSITÆ.

The Composite family.

174. ANTHEMIDIS FLORES.—Chamomile flowers. The dried flower-heads single and double of *Anthemis nobilis.*

Characters.—Single flowers consist of both yellow tubular, and white strap-shaped, florets; double flowers of white strap-shaped florets only; all arising from a conical scaly receptacle; and both very aromatic and bitter.

Active principle.—Bitter extractive and a volatile oil.

Action.—Internally carminative, and tonic, in large doses emetic. A popular external remedy as a fomentation or poultice in whitlow, abscess and sprains.

OLEUM ANTHEMIDIS.—Pale blue or greenish-yellow, but gradually getting yellow; and having the peculiar smell and taste of the flowers.

Dose.—1 to 3 drops on sugar.

EXTRACTUM ANTHEMIDIS.—A brownish extract of pilular consistence, having the smell and taste of the flowers.

Dose.—5 to 10 grs.

SANTONICA.—Unexpanded flower-heads of a species of *Artemisia*, imported from Russia.

Characters.—Flower heads upwards of a line in length, and nearly half a line in breadth, fusiform, blunt at each end, pale greenish-brown; resembling seeds, and having a strong odour and bitter camphoraceous taste.

Active principle.—Crystalline, neutral principle *Santonin.*

Action.—Anthelmintic.

Dose.—10 to 60 grs.

SANTONINUM.—Santonin, a crystalline neutral principle, made from santonica.

Characters.—Colourless flat rhombic prisms, feebly bitter, become yellow on exposure to light, scarcely soluble in cold water, sparingly in boiling water, but freely in chloroform and in boiling rectified spirit.

Dose.—2 to 6 grs.

ARNICÆ RADIX.—Arnica root. Dried rhizome of *Arnica montana*, a native of Middle and Southern Europe.

Characters.—From 1 to 3 in. long, and 2 or 3 lines thick, cylindrical, contorted, rough from scars of leaves, and furnished with many long slender fibres: peppery taste and peculiar smell.

Active principle.—Bitter extractive and an alkaloid *Arnicine.*

Action.—In large doses acro-narcotic poison. Externally used as a resolvent in swellings, sprains and bruises.

Dose.—Of powder 5 to 10 grs.

TINCTURA ARNICÆ.—Nearly colourless or slightly yellow, and having the taste and smell of the rhizome.

Dose.—1 to 2 drs.

TARAXACI RADIX.—Dandelion root. Fresh and dried roots of *Taraxacum dens-leonis*, a native of Great Britain.

Characters.—Tap-shaped roots, dark-brown externally, white internally, easily broken and containing a milky juice, which gets brown by exposure.

Action.—Tonic and cholagogue.

EXTRACTUM TARAXACI.—Softish extract, of a brown colour, and having a pleasant peculiar smell, and bitter taste.

Dose.—10 to 30 grs.

SUCCUS TARAXACI.—Clear reddish brown fluid, having the dandelion smell and a somewhat bitter taste.

Dose.—1 to 3 drs.

LACTUCA.—The flowering herb of *Lactuca virosa*, Lettuce plant, officinal as yielding extractum.

EXTRACTUM LACTUCÆ.—Brownish: the inspissated juice.

Action.—Sedative and anodyne.

Dose.—5 to 15 grs.

PYRETHRI RADIX.—Pellitory. Root of *Anacyclus pyrethrum*, imported from the Levant.

Characters.—In pieces, about the size of the little finger, bark brown studded with black shining points; fracture resinous; taste hot, prickly.

Active principle.—Acrid, resinous principle, *Pyrethrin*.

Action.—Irritant, rubefacient, sialogogue. Chewed to relieve toothache, and as a local stimulant in relaxation of the uvula.

TINCTURA PYRETHRI.—Light brown.

Dose.—Applied locally.

N. O. XXX. LOBELIACEÆ.

The Lobelia family.

175. LOBELIA.—The dried herb *Lobelia inflata*, a native of North America.

Characters.—Stem angular; leaves alternate toothed, ovate, rather hairy beneath, capsule ovoid, 10-ribbed; herb acrid. Usually in compressed rectangular parcels.

Action.—Emetic, expectorant, diaphoretic and sedative.

TINCTURA LOBELIÆ.—Greenish-brown.

Dose.—10 min. to ½ dr.

TINCTURA LOBELIÆ ÆTHEREA.—Brownish-green and having a strong smell of ether.

Dose.—10 minims to ½ dr.

N. O. XXXI. ERICACEÆ.

The Heath family.

176. UVÆ URSI FOLIA.—Dried leaves of *Arctostaphylos uva ursi*, a native of Scotch Highlands and North Europe.

Characters.—Obovate, entire, coriaceous, shining leaves, about $\frac{3}{4}$ inch long, reticulated; taste astringent; when powdered, hay-like odour; leaves not dotted beneath.

Active principle.—Tannic and gallic acids, a volatile oil and crystallisable principle *Arbutin.*

Action.—Astringent and diuretic.

Dose.—10 to 30 grs.

N. O. XXXII. SAPOTACEÆ.

177. Gutta-percha.—The concrete juice of *Isonandra gutta.*

Characters.—In tough flexible pieces, of a light-brown or chocolate colour. Soluble or nearly soluble in chloroform, yielding a more or less turbid solution.

Liquor gutta-percha.—A solution in Chloroform, used in making the *charta sinapis.*

N. O. XXXIII. OLEACEÆ.

The Olive family.

178. **Oleum olivæ.**—Olive oil, expressed in South Europe from the ripe fruit of *Olea Europea.*

Characters.—Pale yellow, scarcely any odour, and a bland oleaginous taste.

Action.—Emollient, laxative.

Dose.—1 to 2 ozs. as a laxative.

Sapo durus.—Hard soap. Greyish white, dry, inodorous; horny and pulverisable when kept in dry warm air.

Linimentum saponis.—Of a pale yellow colour, and having the smell of camphor and rosemary.

Sapo mollis.—Yellowish-green, no smell, of a gelatinous consistence; not imparting an oily stain to paper.

Glycerinum.—A clear colourless fluid, oily to the touch, without odour, of a sweet taste, and soluble in water and in alcohol. Is the excipient in the various officinal *Glycerines,* which contain 1 part of the active ingredient to $4\frac{1}{2}$ of glycerine, except the *Glycerinum amyli* which contains 1 part of starch in $8\frac{1}{2}$ parts of glycerine.

Action.—Emolient and nutrient.

Dose.—1 to 2 drs.

MANNA.—A concrete exudation from the stem of *Fraxinus ornus*, &c., obtained by incision. Calabria and Sicily.

Characters.—In stalactiform pieces, of a yellowish white colour, uneven, porous, and having a faintly nauseous odour and a sweetish taste.

Active principle.—Mannite.

Action.—Laxative.

Dose.—60 grs. to 1 oz.

N. O. XXXIV. STYRACEÆ.

The Storax family.

179. **BENZOINUM.**—Benzoin, balsamic resin got from *Styrax benzoin*, a native of Siam and Sumatra.

Characters.—In lumps, consisting of agglutinated tears or a brownish mottled mass, with or without white tears in it; has an agreeable odour and but little taste; gives off, when heated, fumes of benzoic acid, soluble in rectified spirit and in solution of potash.

Active principle.—A resin, a volatile oil, and a peculiar acid, *Benzoic acid.*

Action.—Stimulant, and expectorant.

Dose.—10 to 20 grs.

TINCTURA BENZOINI COMPOSITA.—Intense reddish brown, with an aromatic odour and warm bitter taste.

Dose.—½ to 1 dr.

ADEPS BENZOATUS.—Used for making suppositories ointments, &c.

ACIDUM BENZOICUM.—Benzoic acid, Light, feathery, crystalline, flexible, plates and needles, nearly colourless and having an agreeable aromatic odour like benzoin. Sparingly soluble in water, but readily in rectified spirit; soluble also in solutions of caustic alkalies and lime, and precipitated from these by hydrochloric acid, unless the solution be very dilute. Melts at 240° and boils at 462° *Fhr.* Borax increases its solubility in water.

Dose.—10 to 15 grs.

N. O. XXXV. LOGANIACEÆ.

The Logania family.

180. **NUX VOMICA.**—The seeds of *Strychnos nux-vomica*, indigenous in Indian forests.

Characters.—Nearly circular and flat, about 1 inch diameter, convex on one side, externally ash-grey and covered with short satiny hairs, internally translucent, tough, horny, inodorous, taste intensely bitter.

Active principle.—*Strychnia* and *Brucia* combined with *Igasuric acid.*

Action—Tonic, and having a peculiar action on the nervous system. In large doses a very active poison.

EXTRACTUM NUCIS VOMICÆ.—Brown colour and intensely bitter taste.

Dose.—$\frac{1}{4}$ to 2 grs.

TINCTURA NUCIS VOMICÆ.—Faint yellow colour, and a peculiar highly bitter taste.

Dose.—10 to 20 minims.

STRYCHNIA.—Colourless and inodorous square octahedrons or prisms, sparingly soluble in water, but giving it an intensely bitter taste. Soluble in boiling rectified spirit and chloroform.

Dose.—Requires to be given with great caution, and its effects carefully watched. $\frac{1}{30}$ to $\frac{1}{12}$ gr., *a very active poison.*

LIQUOR STRYCHNIÆ.—A colourless solution, having a slightly spirituous odour and very bitter taste. Contains 4 gr. in 1 ounce.

Dose.—3 to 10 minims.

N. O. XXXVI. GENTIANACEÆ.

The Gentian family.

181. **GENTIANÆ RADIX.**—Gentian. Dried root of *Gentiana lutea*, which grows in the mountains of Central and Southern Europe.

Characters.—From $\frac{1}{2}$ to 1 inch thick, several inches long, often twisted, much wrinkled, tough, spongy; brown externally, yellow within, taste at first sweetish, afterwards pure, pleasant bitter.

Active principles.—Bitter neutral crystallisable body *Gentiopicrin*, an essential oil, *Gentianic acid*, *Pectin* and sugar.

Action.—Bitter tonic.

EXTRACTUM GENTIANÆ.—A brown extract, when new slightly fragnant, and with a bitter taste.

Dose.—2 to 10 grs.

TINCTURA GENTIANÆ CO.—Brownish yellow, having an aromatic flavour and pleasant bitter taste.

Dose.—$\frac{1}{2}$ to 2 drs.

CHIRATA.—*Syn. Hind.* and *Dak.* Charayatah; *Tam.* Nilavembu; *Tel.* Nela-vemu; *Can.* Nela-bevu; *Beng.* Cherota. The entire dried plant of *Ophelia chirata*, a native of Northern India.

Characters.—Stems from 2 to 3 feet long, about as thick as a quill, round, smooth, pale-brown, with opposite branches; intensely bitter.

Active principles.—Bitter substances, *Ophelic acid* and *chiratin*.

Action.—Bitter tonic.

N. O. XXXVII. ASCLEPIADACEÆ.

The Asclepias family.

182. **HEMIDESMI RADIX.**—Indian sarsaparilla. *Syn.*—*Dak.* Nannari; *Tam.* Nannari. Dried root of *Hemidesmus Indicus*, a common prostrate shrub in waste places in South India.

Characters.—Brownish, round, having a peculiar sweet smell, and agreeable flavour.

Active principle.—Not ascertained.

Action.—Tonic, alterative and diaphoretic.

SYRUPUS HEMIDESMI.—Little or no colour, and the smell and flavour of the root.

Dose.—1 to 2 drs.; keeps badly and might be improved by the addition of a small amount of spirit.

N. O. XXXVIII. CONVOLVULACEÆ.

The Convolvulus family.

183. **JALAPA.**—Jalap. Dried tubercles of *Exogonium purga;* imported from Mexico: also cultivated on the Nilgiris.

Characters.—Ovoid from the size of a nut to that of an orange, the larger tubercles frequently incised; cuticle thin, brown, wrinkled; yellowish grey colour internally with dark brown concentric circles. Powder brownish-grey.

Active principle.—A resin, *Jalapæ resina.*

Action.—Cathartic.

Dose.—10 to 30 grs.

EXTRACTUM JALAPÆ.—Dark brown colour, and aving a peculiar odour and nauseous taste.

Dose.—5 to 15 grs.

PULV. JALAPÆ CO.—Light brownish grey, having the combined smell of jalap and ginger and a nauseous taste.

Dose.—20 to 60 grs.

JALAPÆ RESINÆ.—Dark-brown opaque fragments, translucent at the edges, brittle, fracture resinous, weetish odour, taste acrid in the throat; powder pale brown.

Dose.—2 to 5 grs.

TINCT. JALAPÆ.—Dark reddish brown.

Dose.—$\frac{1}{2}$ to 2 drs.

SCAMMONIÆ RADIX.—Dried root of *Convolvulus scammonia,* from Syria and Asia Minor.

Characters.—Tap-shaped roots, sometimes 3 in. diameter at the top; brown without, white within, slightly odorous; but tasteless.

Active principle.—A gum-resin *Scammonium,* got by incising the living root.

Action.—Active cathartic.

SCAMMONIUM.—Scammony. Ash-grey and rough exter-

nally; fresh fracture resinous, shining, black when dry; odour and flavour cheesy; when chewed causes a prickly sensation in the back of the throat.

Dose.—5 to 10 grs.

PULVIS SCAMMONII CO.—Greyish powder, having the smell of scammony and ginger, and a warm rather nauseous taste.

Dose.—10 to 20 grs.

CONFECTIO SCAMMONII.—Light brown.

Dose.—10 to 30 grs.

SCAMMONIÆ RESINA.—Brownish translucent pieces, brittle, fracture resinous; odour sweet, fragrant.

Dose.—3 to 8 grs.

N. O. XXXIX. SOLANACEÆ.

The Night-shade family.

184. **BELLADONNÆ FOLIA.**—Belladonna leaves. The fresh leaves and small twigs of Deadly Nightshade, *Atropa belladonna*, also the dried leaves.

Characters.—Leaves alternate, 3 to 6 inch long, ovate, acute, entire, smooth, the uppermost in pairs and unequal.

Active principle.—Alkaloid *Atropia.*

Action.—Sedative, anodyne and antispasmodic; all parts of the plant, and its preparations, active poisons.

EXTRACTUM BELLADONNÆ.—Greenish brown mass, which becomes black, having the peculiar odour of the plant when bruised.

Dose.—$\frac{1}{4}$ to 1 gr. Has the power of dilating the pupil, and often applied around the eye for that purpose.

EMPLASTRUM BELLADONNÆ.—Deep olive colour.

TINCTURA BELLADONNÆ.—Deep brown.

Dose.—5 to 20 minims.

BELLADONNÆ RADIX.—Belladonna root. From 1 to 2 feet long and from $\frac{1}{2}$ to 2 in. thick, branched and wrinkled, brownish white.

LINIMENTUM BELLADONNÆ.—Brown colour.

ATROPIA.—Colourless, acicular crystals, sparingly soluble in water, readily in alcohol and ether. Very active poison.

LIQUOR ATROPIÆ.—A colourless fluid, contains 4 grs. of alkaloid in 1 oz.; for external use.

ATROPIÆ SULPHAS.—A colourless powder, soluble in water, and solution neutral to test paper. Dilates the pupil.

LIQUOR ATROPIÆ SULPHATIS.—A colourless fluid, neutral to test paper, contains 4 grs. of alkaloid in 1 oz.; for external use only.

STRAMONII FOLIA.—*Syn.* — *Dak.* Ujla-dhaturah ; *Tam.* Umattai; *Tel.* Ummette; *Can.* Ummatte-gida; *Beng.* Dhutura. The dried leaves of the Thorn-apple, *Datura stramonium*, cultivated in Britain, also, of *Datura alba*, common in India.

Characters.—(*D. Stramonium*) large, ovate, sinuous, deeply cut; of a heavy odour, and having a mawkish, faintly bitter, nauseous taste. (*D. Alba*) ovate, acuminate, repandly toothed, unequal at the base, downy.

Active principle.—An alkaloid, *Daturine.*

Action.—Anodyne and antispasmodic, in large doses an active poison. Dilates the pupil.

Dose.—1 to 3 grs. in powder. For smoking 10 to 30 gr[illegible], beginning with the lesser dose and increasing the quanti[illegible] very gradually.

STRAMONII SEMINA.—Brownish-black, reniform, flat, rough, in taste feebly bitter and somewhat mawkish. When bruised have a heavy smell.

EXTRACTUM STRAMONII.—A firm extract soon getting hard, of a deep brown colour, having the peculiar odour of the bruised leaves.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ gr.

TINCT. STRAMONII.—Light brown.

Dose.—10 to 20 minims.

HYOSCYAMI FOLIA.—Hyoscyamus leaves. The fresh leaves and branches, and the dried leaves of *Hyoscyamus niger*, wild in Britain and cultivated in India.

Characters.—Leaves sinuated, clammy and hairy. The fresh plant has a strong rather disagreeable odour.

Active principle.—An alkaloid, *Hyoscyamine.*

Action.—Sedative, anodyne and antispasmodic.

EXTRACTUM HYOSCYAMI.—Deep brownish-green, soft extract, having the peculiar smell of the fresh plant.

Dose.—5 to 10 grs.

TINCTURA HYOSCYAMI.—Slightly reddish brown, and having the peculiar smell and flavour of the plant.

Dose.—$\frac{1}{2}$ to 1 dr.

TABACI FOLIA.—Tobacco leaves. *Syn.*—*Hind.* Tanbaku; *Dak.* Tamaku; *Tam.* Pugai-ilai; *Tel.* Pogaku; *Can.* Hogesappu; *Beng.* Tamaku. Dried leaves of Virginian tobacco, *Nicotiana tabacum,* cultivated in America and India.

Characters.—Large mottled brown, ovate or lanceolate, acuminate leaves, bearing numerous glandular hairs, having a peculiar heavy odour, and bitter acrid taste.

Active principle.—Liquid alkaloid *Nicotine,* and volatile oil *Nicotianin.*

Action.—Powerfully sedative and antispasmodic, in large doses poisonous; only used as an enema in doses of 20 grs. infused in 8 oz. of water.

DULCAMARA.—Bitter sweet. Dried young branches of *Solanum dulcamara,* grows in Europe and temperate Asia.

Characters.—Light hollow pieces about the thickness of a quill, bitter and subsequently sweetish, hence called Bittersweet.

Action.—Alterative and diaphoretic.

Dose.—Of infusion 1 to 2 oz.

CAPSICI FRUCTUS.—Capsicum fruit. *Syn.*—*Hind.* Lal-mirch; *Dak.* Lal-mirchi; *Tam.* Milagay; *Tel.* Mirapakaya; *Can.* Menashina-kayi; *Beng.* Lal-morich. Dried ripe fruit of *Capsicum fastigiatum,* from Zanzibar and India.

Characters.—Pod membranous, from 5 to 8 lines long, 2 lines broad, conical, smooth, shining, orange-red, intensely hot taste.

Active principle.—A resinous substance *Capsicin.*

Action.—Stimulant, carminative.

Dose.—1 to 4 grs.

TINCTURA CAPSICI.—Reddish green colour, with the hot peculiar taste of the fruit.

Dose.—10 to 20 minims.

N. O. XL. LABIATÆ.

The Labiate family.

185. **OLEUM LAVANDULÆ.**—Oil of Lavender, distilled from the flowers of *Lavandula vera.*

Characters.—Colourless or pale yellow, with the fragrance of lavender and a hot bitter aromatic taste.

Action.—Carminative and antispasmodic.

Dose.—2 to 5 drops.

TINCTURA LAVANDULÆ CO.—Deep red tincture, having the fragrance of lavender and a warm taste.

Dose.—1 to 2 drs.

OLEUM MENTHÆ PIPERITÆ.—Oil of Peppermint distilled from the fresh plant, *Mentha piperita.*

Characters.—Pale yellow, odour of peppermint, warm aromatic taste, succeeded by a sensation of coldness in the mouth.

Action.—Carminative and antispasmodic.

Dose.—2 to 5 drops on sugar or in emulsion.

ESSENTIA MENTHÆ PIPERITÆ.—Straw colour.

Dose.—10 to 20 minims.

SPIRITUS MENTHÆ PIPERITÆ.—Colourless.

Dose.—30 to 60 minims.

OLEUM MENTHÆ VIRIDIS.—Oil of Spearmint distilled from the fresh plant, *Mentha viridis.*

Characters.—Pale yellow, with the odour and taste of Spearmint.

Action.—Carminative and antispasmodic.

Dose.—1 to 5 drops on sugar or in emulsion.

OLEUM ROSMARINI.—Oil of Rosemary distilled from the flowering tops of *Rosmarinus officinalis.*

Characters.—Colourless, with a warm aromatic taste and the odour of Rosemary.

Action.—Carminative, but chiefly used as an ingredient in liniments.

Dose.—2 to 5 drops on sugar or in emulsion.

N. O. XLI. SCROPHULARIACEÆ.

The Figwort family.

186. **DIGITALIS FOLIA.**—Foxglove leaves. The dried leaves of *Digitalis purpurea*, a native of Britain and naturalised on the Nilgiris and other hill ranges of India.

Characters.—Ovate-lanceolate, shortly petiolate, rugose, downy, crenate, paler on the under surface.

Active principle.—A bitter principle, *Digitalin.*

Action.—Sedative and diuretic.

Dose.—$\frac{1}{2}$ to 2 grs.

TINCT. DIGITALIS.—Dark greenish brown colour.

Dose.—10 to 30 minims, larger doses are given in delirium tremens.

DIGITALINUM.—A bitter substance, the active principle of Digitalis.

Characters.—In porous mammillated masses or small scales, white, inodorous, and intensely bitter; soluble in spirit but nearly insoluble in water.

Action.—Same as digitalis, but much more powerful, and requires to be used with the greatest caution.

Dose.— $\frac{1}{60}$ to $\frac{1}{16}$ of a gr.

N. O. XLII. POLYGONACEÆ.

The Buckwheat family.

187. **RHEI RADIX.**—Rhubarb. The dried, decorticated root of one or more species of *Rheum;* from China, Chinese Tartary and Thibet.

Characters.—Trapezoidal, roundish, cylindrical or flattish pieces, frequently bored with 1 hole, yellow externally, internally marbled with greyish and reddish lines, gritty when chewed; taste bitter, faintly astringent and aromatic; odour peculiar.

Active principle.—Doubtful; one constituent *chrysophan* is said to be purgative.

Action.—A mild tonic cathartic, and secondarily astringent. In small doses a useful tonic.

Dose.—5 to 20 grs.

EXTRACTUM RHEI.—Reddish brown firm mass, having the peculiar smell and the taste of the root.

Dose.—3 to 5 grs.

TINCTURA RHEI.—Reddish brown, having the smell and taste of the root.

Dose.—1 to 2 drs.

VINUM RHEI.—Deep orange. Warm aromatic taste and smell of rhubarb.

Dose.—10 to 40 minims.

SYRUPUS RHEI.—Dark reddish brown colour, and having the smell and taste of rhubarb and coriander.

Dose.—1 to 4 drs.

PILULA RHEI COMPOSITA.—Brownish mass, having the smell, when warmed, of aloes and peppermint.

Dose.—5 to 10 grs.

PULVIS RHEI COMPOSITUS.—A light greyish powder, having a distinct odour of rhubarb, more especially when moistened.

Dose.—20 to 60 grs.

N. O. XLIII. LAURACEÆ.

The Laurel family.

188. **CAMPHORA**.—Camphor. *Syn.—Hind.* Kafur; *Dak.* Kapur; *Tam.* Karruppuram; *Tel.* Karpuram; *Can.* Karpura; *Beng.* Kapur. A concrete volatile oil obtained from the wood of *Camphora officinarum*, imported from China and Japan.

Characters.—White, translucent, crystalline, has a peculiar strong smell, and a pungent taste, followed by a sensation of cold; volatalises at ordinary temperatures, slightly soluble in water, readily soluble in rectified spirit or ether.

Action.—Sedative and anodyne, also antispasmodic. In large doses irritant and narcotic.

Dose.—1 to 10 grs.

TINCTURA CAMPHORÆ COMPOSITA.—Reddish yellow, with the smell and taste of camphor and anise.

Action.—Sedative and astringent.

Dose.—15 minims to 2 drs.

SPIRITUS CAMPHORÆ.—Colourless with the smell and taste of camphor.

Dose.—10 to 30 minims on sugar or in milk.

LINIMENTUM CAMPHORÆ.—Has the appearance of olive oil and a strong smell of camphor.

LINIMENTUM CAMPHORÆ COMPOSITUM.—A clear fluid with a strong smell of ammonia, camphor and lavênder combined.

SASSAFRAS RADIX.—Dried root of *Sassafras officinale*, a native of North America.

Characters.—In branched pieces sometimes 8 in. diameter at the crown, bark greyish brown externally, rusty-brown internally, having an aromatic odour and a peculiar warm taste. Wood light, porous, greyish-yellow, more feeble in odour and taste than the bark.

Active principle.—Volatile oil, resin, &c.

Action.—Diaphoretic, alterative and tonic (?). An ingredient in compound decoction of sarsaparilla.

NECTANDRÆ CORTEX.—Bebeeru bark. The bark of *Nectandra rodiæi*, a native of British Guiana.

Characters.—Large flat heavy pieces, about $\frac{1}{4}$ inch thick. Externally greyish-brown, internally cinnamon-brown; taste very bitter and somewhat astringent.

Active principle.—An alkoloid *Beberia.*

Action.—Tonic and astringent; officinal on account of its alkaloid.

BEBERIÆ SULPHAS.—Sulphate of Beberia. Dark brown thin translucent scales, yellow in powder, with a strong bitter taste, and soluble in water and alcohol.

Dose.—1 to 10 grs.

CINNAMOMI CORTEX.—Cinnamon bark. *Syn.*—*Hind.* Darchini; *Dak.* Dalchini; *Tam.* Lavangap-pattai; *Tel.* Lavanga-patta; *Can.* Lavanga-patte; *Beng.* Dal-chinni. The inner bark of *Cinnamomum zeylanicum*, from Ceylon.

Characters.—In closely rolled quills, about $\frac{1}{5}$th line thick, containing several small quills within them: light yellowish-brown, odour peculiarly fragrant, taste warm, sweetish aromatic. Quills break with splintery fracture.

Active principle.—A volatile oil; it also contains cinnamic acid and tannin.

Action.—Aromatic, carminative and slightly stimulant.

Dose.—10 to 20 grs.

OLEUM CINNAMOMI.—Yellowish when new, gradually getting red, and having the odour and taste of cinnamon. Sinks in water.

Dose.—5 to 20 minims.

PULV. CINNAMOMI CO.—Deep fawn colour.

Dose.—3 to 10 grs.

TINCTURA CINNAMOMI.—Deep brown colour.

Dose.—1 to 2 drs.

N. O. XLIV. MYRISTICACEÆ.

The Nutmeg family.

189. **MYRISTICA.**—Nutmeg. *Syn.*—*Hind.* Jaephal; *Dak.* Japhal; *Tam.* Jaddikkay; *Tel.* Jaji-kaya; *Can.* Jaji-kayi; *Beng.* Jae-phal. The kernel of the fruit of *Myristica officinalis*; from the Malayan Archipelago.

Characters.—Oval or nearly round, about 1 inch long, furrowed, internally greyish red with dark brownish veins; aromatic peculiar odour, and a bitter aromatic taste.

Active principle.—The officinal volatile oil, *Oleum myristicæ.*

Action.—Carminative and slightly stimulant.

Dose.—10 to 20 grs.

Oleum myristicæ.—Straw coloured with the odour and taste of nutmeg.

Dose.—1 to 5 minims.

Oleum myristicæ expressum.—Of an orange colour, firm consistence and fragrant odour like that of nutmeg. Used as an ingredient of emplastrum calefaciens, and emplastrum picis; and as an external application in rheumatic pains and in sprains.

N. O. XLV. THYMELACEÆ.

The Daphne family.

190. **MEZEREI CORTEX.**—Mezereon bark. The dried bark of *Daphne mezereum* cultivated in Europe.

Characters.—In strips or quilled pieces of various lengths, tough and pliable, olive-brown on the surface, white within, fibrous, odour faintly nauseous, taste hot and acrid.

Active principle.—An acrid resin and a volatile oil.

Action.—Stimulant, diaphoretic, diuretic, and alterative.

Dose.—10 to 12 grs.

N. O. XLVI. EUPHORBIACEÆ.

The Spurge family.

191. **CASCARILLÆ CORTEX.**—Cascarilla bark. The bark of *Croton eluteria* from the Bahama islands.

Characters.—In quills 2 or 3 inch. long, and from 2 to 5 lines in diameter, dull brown, speckled with white crustaceous lichens ; short resinous fracture, warm bitter taste and emits a fragrant odour when burned.

Active principle.—A volatile oil, a bitter crystallizable principle *Cascarillin*, and tannin.

Action.—Bitter, tonic, and perhaps slightly astringent, as it proves useful in chronic diarrhœa, and dysentery.

Dose.—10 to 20 grs.

OLEUM CROTONIS.—Croton oil, expressed from the seeds of *Croton tiglium* a native of India.

Characters.—Slightly viscid; colour brownish yellow, taste acrid, odour faintly nauseous.

Action.—A powerful drastic purgative, and to be used with caution. Externally stimulant and rubefacient.

Dose.—$\frac{1}{3}$ to 1 minim.

OLEUM RICINI.—*Syn.*—*Hind.* Arandi-ka-tel ; *Dak.* Yarandi-ka-tel; *Tam.* Amanak-kenney ; *Tel.* Amudam ; *Can.* Haralenne. Castor oil expressed from the seeds of *Ricinus communis*, cultivated in India.

Characters.—Viscid, colourless or pale straw yellow, having a slightly nauseous odour, and somewhat acrid taste. Entirely soluble in 1 volume of alcohol, and in 2 volumes of rectified spirit.

Action.—Laxative in small doses, purgative in large.

Dose.—2 to 3 drs. as a laxative : 4 to 8 drs. as a purgative.

KAMALA.—*Syn.*—*Hind.* Kamela; *Tam.* Kamela-mavu ; *Beng.* Kamela. A powder which covers the exterior of the capsules of *Mallotus philippinensis* a common tree in India.

Characters.—A fine granular mobile powder, of a red colour; difficult to mix with water, but when boiled with alcohol or in an alkaline solution the greater part is dissolved, forming a red liquor.

Action.—Anthelmintic, chiefly used for tape-worm.

Dose.—30 grs. to 2 drs.

N. O. XLVII. URTICACEÆ.

The Nettle family.

192. **LUPULUS.**—Hop. The dried strobiles of the female plant of *Humulus lupulus;* cultivated in England.

Characters.—Strobiles of a greenish yellow colour, with minute yellow grains (Lupuline) adherent to base of scales. Odour aromatic, taste bitter.

Active principle.—A volatile alkaloid *Lupuline* and a bitter principle.

Action.—Bitter tonic, and slightly narcotic.

EXTRACTUM LUPULI.—A brown bitter extract having the odour of hop.

Dose.—5 to 15 grs.

MORI SUCCUS.—Mulberry juice. Juice of the ripe fruit of *Morus nigra.*

Characters.—Dark violet coloured juice, and an acidulous sweet taste.

Action.—Used as a colouring agent.

SYRUPUS MORI.—Lake colour. Used chiefly as a colouring agent.

Dose.—1 dr.

FICUS.—Fig. The dried fruit of *Ficus carica.* Asia and Southern Europe.

Action.—Demulcent, laxative and nutritive. An ingredient in confectio sennæ.

CANNABIS INDICA.—Indian Hemp. *Syn.*—*Hind.* and *Dak.* Ganja; *Tam.* Ganja; *Tel.* Bangi; *Can.* Bhangi. The dried flowering tops of the female plant of *Cannabis sativa,* a native of Persia cultivated in India.

Characters.—Tops consisting of one or more alternate branches, bearing the remains of the flowers and smaller leaves and a few ripe fruits pressed together in masses. The *Ganja* of the Bazaars, used for smoking in India. Has a dusky green colour and a peculiar odour.

Active principle.—A resinous substance, the *Churrus* of India.

Action.—At first acts as a stimulant, and then as an anodyne, calmative, and narcotic.

EXTRACTUM CANNABIS INDICÆ.—A dark green coloured extract, speedily becoming hard.

Dose.—$\frac{1}{4}$ to 1 gr.

TINCTURA CANNABIS INDICÆ.—Deep brown.

Dose.—5 to 20 minims.

Incompatibles.—Water and watery mixtures.

N. O. XLVIII. ULMACEÆ.

The Elm family.

193. **ULMI CORTEX.**—Elm bark. The dried bark of *Ulmus campestris*, cultivated in England.

Characters.—A tough brownish yellow bark about half a line thick, without smell; taste mucilaginous, slightly bitter and astringent. Decoction turned green by perchloride of iron, and precipitates with a solution of gelatine.

Active principle.—Tannin and a peculiar gummy principle *Ulmin.*

Action.—Astringent, demulcent and slightly tonic.

DECOCTUM ULMI.—

Dose.—2 to 4 oz.

Incompatibles.—Acetate of Lead and Sulphate of Iron.

N. O. XLIX. CUPULIFERÆ.

The Oak family.

194. **QUERCUS CORTEX.**—Oak bark. The dried bark of the small branches and young stems of *Quercus pedunculata*, a native of great Britain.

Characters.—Greyish shining epidermis, cinnamon coloured on the inner surface, fibrous, brittle, and strongly astringent.

Active principle.—Tannic and gallic acids.

Action.—Astringent: prescribed in the form of Decoctum quercus in doses of from $1\frac{1}{4}$ ounce to 1 pint.

Incompatibles.—Metallic salts, Mineral acids, alkaloids, and alkalies.

GALLA.—Galls. Excrescences on *Quercus infectoria* caused by the punctures and deposited ova of the insect, *Diplolepis gallæ-tinctoriæ.*

Characters.—Hard, heavy, globular bodies, from $\frac{1}{2}$ to $\frac{3}{4}$ in. in diameter, tuberculated on the surface, the tubercles and intervening spaces smooth; of a bluish green colour externally, yellowish-white within, with a small central cavity; intensely astringent.

Active principle.—Tannic and gallic acids.

Action.—Astringent and slightly tonic.

ACIDUM GALLICUM.—Gallic acid. In acicular prisms or silky needles, sometimes nearly white but generally of a pale fawn-colour. Requires 100 parts of cold, but dissolves in 3 parts of boiling water. Soluble in rectified spirit. Aqueous solution gives no precipitate with solution of isinglass; but gives a bluish-black precipitate with a persalt of iron.

Dose.—2 to 10 grs.

Incompatibles.—Metallic salts and Spt. ætheris nitrosi.

ACIDUM TANNICUM.—Tannic acid. In pale yellow vesicular masses or thin glistening scales, with a strongly astringent taste and an acid re-action; readily soluble in water and rectified spirit, very sparingly soluble in ether. Aqueous solution precipitates solution of gelatine yellowish-white, and the persalts of iron of a bluish-black colour. Leaves no residue when burned in air.

Dose.—2 to 10 grs.

Incompatibles.—Alkalies; mineral acids; preparations of lead; persalts of iron, antimony and silver; vegetable alkaloids and emulsions.

SUPPOSITORIA ACIDI TANNICI.—Light drab-colour.

GLYCERINUM ACIDI TANNICI.—Brownish yellow.

Dose.—10 to 40 minims.

N. O. L. PIPERACEÆ.

Pepper family.

195. **PIPER NIGRUM.**—Black pepper. *Syn.—Hind.* Kali-mirch; *Dak.* Kali-mirchi; *Tam.* Milagu; *Tel.* Miriyalu; *Can.* Menasu; *Beng.* Kala-morich. The dried unripe berries of *Piper nigrum*, cultivated in India, &c.

Characters.—Small, roundish, wrinkled; tegument brownish-black, containing a greyish-yellow globular seed. Odour aromatic. Taste pungent and bitterish.

Active principle.—Volatile oil, acrid resin and a crystalline principle *Piperine.*

Action.—Stimulant, carminative and antiperiodic: externally rubefacient, irritant.

Dose.—5 to 10 grs.

CUBEBA.—Cubebs. *Syn.—Hind.* and *Dak.* Kabab-chini: *Tam.* Valmilaku; *Tel.* Toka-miriyaliu; *Can.* Balamenasu; *Beng.* Kabab-chini. The dried unripe fruit of *Cubeba officinalis*, cultivated in Java.

Characters.—The size of black pepper, globular, wrinkled, blackish, with a short stalk: has a warm camphoraceous taste and characteristic odour.

Active principle.—Volatile oil, acrid resin, and a crystalline principle *Cubebin.*

Action.—Has a stimulant effect on mucous membranes, more especially that of the male urethra.

Dose.—30 to 120 grs.

OLEUM CUBEBÆ.—The oil distilled from cubebs.

Characters.—Colourless or pale greenish-yellow, having the peculiar smell and taste of cubebs.

Dose.—5 to 20 minims.

TINCT. CUBEBÆ.—Pale yellow.

Dose.—1 to 2 drs.

N. O. LI. ARISTOLOCHIACEÆ.

The Birth-wort order.

196. **SERPENTARIÆ RADIX.**—The dried rhizome of *Aristolochia serpentaria*, from the Southern parts of North America.

Characters.—A small roundish rhizome, with a tuft of numerous slender rootlets, about 3 in. long, yellowish, of an agreeable camphoraceous odour, and a warm bitter camphoraceous taste.

Active principle.—Bitter principle and a volatile oil.

Action.—Stimulant, tonic, diaphoretic.

Dose.—10 to 30 grs.

TINCTURA SERPENTARIÆ.—Reddish-brown colour.

Dose.—$\frac{1}{2}$ to 2 drs.

N. O. LII. CONIFERÆ.

The Cone bearing or Pine family.

197. **LARICIS CORTEX.**—Inner bark of Larch-fir, *Larix Europœa.*

TINCT. LARICIS.

Dose.—20 to 25 minims.

TEREBINTHINA CANADENSIS.—Canada balsam. The turpentine got by incision from the stem of *Abies balsamea* from Canada.

Characters.—A pale-yellow ductile oleo-resin, of the consistence of thin honey, and with a peculiar agreeable odour and a slightly bitter feebly acrid taste; by exposure drying very slowly into a transparent adhesive varnish; solidifying when mixed with a sixth of its weight of magnesia.

Action.—Stimulant, rarely employed except as an ingredient in *charta epispastica*, and *collodium flexile.*

Dose.—20 to 30 grs.

PIX BURGUNDICA.—Burgundy Pitch. A resinous exudation from the stem of the Spruce fir, *Abies excelsa;* from Switzerland.

Characters.—Hard, brittle, yet gradually taking the form of the vessel in which it is kept; opaque, varying in colour but generally dull reddish brown; of a peculiar somewhat empyreumatic perfumed odour, and aromatic taste without bitterness; free from vesicles; gives off no water when heated.

Action.—Stimulant and rubefacient, only used as a constitutent of plasters.

Emplastrum picis.—A hard brittle plaster of a light brownish-yellow colour, and having an aromatic odour.

THUS AMERICANUM.—Common Frankincense. The concrete turpentine of *Pinus tæda*, the Frankincense pine, and *Pinus palustris* the Swamp pine; from the Southern States of North America.

Characters.—A softish bright-yellow opaque solid, resinous but tough, having the odour of American turpentine.

Action.—Stimulant, rubefacient, an ingredient in *Emplastrum picis.*

OLEUM TEREBINTHINÆ.—Oil of turpentine. The oil distilled from the oleo-resin got from *Pinus palustris*, *Pinus tæda* and sometimes *Pinus pinaster.*

Characters.—Limpid, colourless, with a strong peculiar odour, and pungent bitter taste.

Action.—Internally stimulant, diuretic, anthelmintic and purgative, also sedative and astringent; externally rubefacient.

Dose.—10 to 20 minims as a diuretic and astringent; as a stimulant $\frac{1}{2}$ to 1 dr.; as an anthelmintic 3 to 4 drs. in combination with castor oil.

RESINA.—The residue of the distillation of the turpentines from various species of *Pinus.*

Characters.—Translucent, yellowish, brittle, pulverisable; fracture shining; odour and taste faintly terebinthinate. It is easily fusible, and burns with a dense yellow flame and much smoke.

Action.—Stimulant; only used as an ingredient in ointments, plasters and *charta epispastica.*

Unguentum resinæ.—Yellowish-brown rather firm ointment.

PIX LIQUIDA.—Tar. A bituminous liquid, got from the wood of *Pinus sylvestris* and other pines by destructive distillation.

Characters.—Thick, viscid, brownish-black, of a well-known peculiar aromatic odour. Water agitated with it acquires a pale brown colour, sharp empyreumatic taste, and acid re-action.

Action.—Stimulant; chiefly used as an external application.

CREASOTUM.—Creasote.—A product of the distillation of wood tar.

Characters.—A liquid, colourless or with a yellowish tinge, and a strong empyreumatic odour. It is sparingly dissolved by water, but freely by alcohol, ether and glacial acetic acid. Sp. grav. 1·071. It coagulates albumen. A slip of deal dipped into it, and afterwards into hydrochloric acid, acquires on exposure for a short time to the air a greenish blue colour. Dropped on white filtering paper and exposed to a heat of 212°, it leaves no translucent stain. It turns the plane of polarisation of a ray of polarised light to the right. It is not solidified by the cold produced by a mixture of hydrochloric acid and sulphate of soda.

Action.—Sedative internally; externally irritant and caustic. A powerful antiseptic, preserving animal substances by coagulating the albumen.

Dose.—1 to 3 drops.

OLEUM JUNIPERI.—Oil of Juniper. The oil distilled from the unripe fruit of *Juniperus communis;* Scotland and Northern parts of Europe and Asia.

Characters.—Colourless or pale greenish yellow, of sweetish odour, and warm aromatic taste.

Action.—Stimulant and diuretic.

Dose.—1 to 5 minims.

SPIRITUS JUNIPERI.—Colourless and having the smell and taste of the oil.

Dose.—30 to 60 minims.

SABINÆ CACUMINA.—Savin tops. The fresh and dried tops of *Juniperus sabina;* from plants cultivated in Britain.

Characters.—Twigs densely covered with minute imbricated appressed leaves in four rows; odour strong, peculiar and unpleasant; taste acrid, bitter, resinous, and disagreeable.

Action.—Emmenagogue; in large doses an irritant poison.

Dose.—4 to 10 grs.

Oleum sabinæ.—A colourless or pale yellow oil, having the smell of the plant and an acrid taste.

Dose.—1 to 5 minims, in emulsion or on sugar.

Tinctura sabinæ.—A yellowish tincture, having the odour and taste of the oil of savin.

Dose.—20 to 60 minims.

Unguentum sabinæ.—A greenish ointment, having the peculiar odour of savin.

Action.—Used for keeping blisters open and for dressing setons to keep up a free discharge.

N. O. LIII. SMILACEÆ.

The Sarsaparilla family.

198. **SARSÆ RADIX.**—Sarsaparilla. Dried root of *Smilax officinalis;* native of Central America.

Characters.—Roots not thicker than a goose quill, generally many feet in length, reddish brown, covered with rootlets, and folded in bundles about 18 inches long scentless; taste mucilaginous, feebly bitter, faintly acrid.

Active principle.—*Smilacin* a crystallizable principle, a very little volatile oil and some resin.

Action.—Diaphoretic, alterative (?) tonic.

Dose.—Given in decoction, &c.

Extractum sarsæ liquidum.—Thick dark reddish-brown liquid, having the taste and flavour of sarsaparilla.

Dose.—2 to 4 drs.

N. O. LIV. LILIACEÆ.

The Lily family.

199. **ALOE SOCOTRINA.**—Socotrine aloes. The inspissated juice of the leaves of one or more undetermined species of *Aloe.* From Socotra Island, via Bombay.

Characters.—In reddish-brown masses, opaque or translucent at the edges; fracture irregular or smooth and resinous; taste bitter, and strong fragrant odour; dissolves

entirely in proof spirit, and during solution exhibits under the microscope numerous minute crystals.

Active principle.—A peculiar principle *Aloin*, a *resin* and a *volatile oil.*

Action.—Purgative and emenagogue; in small doses tonic. In purgative doses acts chiefly on the large intestine. Purgative effects much increased by combination with sulphate of iron.

Dose.—2 to 6 grs.

PILULA ALOES SOCOTRINÆ.—Dark brown colour; bitter taste; and smell of oil of nutmeg.

Dose.—5 to 10 grs.

PILULA ALOES ET MYRRHÆ.—Reddish brown colour; bitter aromatic taste; smells of saffron.

Dose.—5 to 10 grs.

PILULA ALOES ET ASSAFŒTIDÆ.—Brownish colour; smells of assafœtida and has a bitter taste.

Dose.—5 to 10 grs.

DECOCTUM ALOES COMPOSITUM.—Thickish, reddish-black fluid with an aromatic smell.

Dose.—$\frac{1}{2}$ to 2 ozs.

EXTRACTUM ALOES SOCOTRINÆ.—Dry black mass, often in small pieces, with an aromatic odour, but less glossy fracture than the aloes.

Dose.—2 to 6 grs.

VINUM ALOES.—Red colour; bitter taste and aromatic flavour.

Dose.—1 to 2 drs.

TINCTURA ALOES.—Dark coloured tincture with the odour and taste of the aloes.

Dose.—1 to 2 drs.

ALOE BARBADENSIS.—Barbadoes aloes. The inspissated juice of *Aloe vulgaris*, from Barbadoes.

Characters.—Yellowish brown or dark-brown opaque

masses; dull conchoidal fracture; nauseous bitter taste, and a strong disagreeable odour somewhat like the smell of rank perspiration; dissolves almost entirely in proof spirit, and during solution exhibits under the microscope numerous crystals.

Active principle.—Aloin a *resin* and *volatile oil.*

Action.—Same as that of socotrine but harsher.

Dose.—2 to 6 grs.

EXTRACTUM ALOES BARBADENSIS.—Generally in small black angular pieces, and having the nauseous taste and smell of the aloes.

Dose.—2 to 6 grs.

PILULA ALOES BARBADENSIS.—Dark brown colour, bitter warm taste and having the odour of oil of caraway.

Dose.—5 to 10 grs.

PILULA ALOES ET FERRI.—Deep greenish-brown colour.

Dose.—5 to 10 grs.

SCILLA.—Squill. The sliced and dried root of *Urginea scilla,* a native of the Mediterranean coasts.

Characters.—Bulb pear-shaped, weighing half to ten-pounds; outer scales membranous, brownish-red or white; inner scales thick, whitish, fleshy, juicy; taste mucilaginous, intensely and disagreeably bitter, somewhat acrid. Dried slices white or yellowish white, slightly translucent, scentless, disagreeably bitter, brittle and easily pulverizable if very dry, but, if exposed, readily recovering moisture and flexibility. In India the root of *Urginea Indica* is used. This root is about the size of a large apple, and has the taste of the officinal squill.

Active principle.—A resinous bitter substance.

Action.—In small doses expectorant and diuretic: in large doses emetic, purgative, irritant.

Dose.—1 to 3 grs.

TINCTURA SCILLÆ.—Straw colour.

Dose.—10 to 30 minims.

ACETUM SCILLÆ.—Pale yellow colour.

Dose.—15 to 40 minims.

SYRUPUS SCILLÆ.—Yellowish brown, taste sweetish and acetous.

Dose.—½ to 1 dr.

PILULA SCILLÆ COMPOSITA.—Brown and having an aromatic odour.

Dose.—5 to 10 grs.

N. O. LV. MELANTHACEÆ.

The Colchicum family.

200. **COLCHICI CORMUS.**—Colchicum corm. The fresh corm of *Colchicum autumnale;* collected about the end of June; and the same stripped of its coats, sliced transversely, and dried at a temperature not exceeding 150° Fhr.

Characters.—About the size of a chesnut, flattened where it has an undeveloped bud; outer coat brown, inner yellow; internally white, solid and fleshy. Juice milky, acrid and bitter. Dried slices about a line thick indented on one side, firm, flat, whitish amylaceous.

COLCHICI SEMINA.—Colchicum seeds. The fully ripe seeds of the *Colchicum autumnale.*

Characters.—About the size of a white mustard seed, very hard and of a reddish-brown colour.

Active principle.—In both *Colchicin,* a peculiar crystallizable principle.

Action.—Cathartic, diuretic and sedative, used chiefly in some forms of rheumatism and in gout.

Dose.—Of the corm in powder 2 to 8 grs. The seeds are prescribed only in the form of tincture.

EXTRACTUM COLCHICI.—The inspissated juice of the fresh corm; of a brownish colour and acrid bitter taste.

Dose.—½ to 2 grs.

EXTRACTUM COLCHICI ACETICUM.—Of a brownish colour, an acetous smell, and bitter acrid taste.

Dose.—½ to 2 grs.

Vinum colchici.—Light brown colour and depositing a sediment.

Dose.—10 to 30 minims.

Tinctura colchici seminum.—Brownish colour.

Dose.—10 to 30 minims.

VERATRI VIRIDIS RADIX.—Green hellebore root. The dried rhizome of *Veratrum viride*, collected in autumn in the United States and Canada.

Characters.—Somewhat truncated top with a thick hard base, and numerous pale radicles attached to it. Taste at first sweetish, and then bitter, followed by a persistent acrid burning sensation in the mouth.

Active principle.—An alkaloid substance, identical with Veratria.

Action.—A very powerful sedative especially of the circulation, and in large doses emetic and depressant.

Dose.—1 to 2 grs. of powdered root.

Tinctura veratri viridis.—Dark brown.

Dose.—5 to 20 minims.

SABADILLA.—Cevadilla. The dried root of *Asagræa officinalis*, imported from Mexico.

Characters.—Fruit about ½ inch long, consisting of three light brown papyraceous follicles, each containing from 1 to 3 seeds, which are about ¼ inch long, blackish-brown, shining, slightly winged, and possessing an intensely acrid bitter taste.

Active principle.—The alkaloid *Veratria.*

Action.—Highly irritant, rarely given internally as it causes vomiting and purging. Externally used as a rubefacient. A dangerous remedy however employed.

Veratria.—Pale grey, amorphous, without smell, but even in the most minute quantity irritating the nostrils; strongly and persistently bitter, and highly acrid; insoluble in water, soluble in spirit, in ether and in diluted acids, leaving traces of an insoluble brown resinoid matter.

Heated with access of air it melts into a yellow liquid, and at length burns away, leaving no residue. An active irritant poison.

Dose.—Only used in the form of ointment which should never be applied to a raw surface. Ointment of a light fawn colour.

N. O. LVI. PALMACEÆ.

201. Areca.—*Syn.*—*Hind.* Supyari; *Duk.* Supari; *Tam.* Pakku; *Tel.* Pokavakka; *Can.* Adike; *Beng.* Supari. The seed of *Areca catechu* the Betel-nut tree. Imported from the East Indies.

Active principle.—Tannin and Catechu.

Action.—Astringent and vermicide.

Dose.—$\frac{1}{2}$ to $\frac{3}{4}$ ounce in powder.

N. O. LVII. ZINGIBERACEÆ.

The Ginger family.

202. Zingiber.—*Syn.*—*Hind.* Sonth; *Dak.* Sont; *Tam.* Shukku; *Tel.* Sonti; *Can.* Vana-sunthi; *Beng.* Sont. The scraped and dried root of *Zingiber officinale;* from cultivated plants in the East and West Indies, &c.

Characters.—Irregular lobed, decorticated pieces, three or four inches long, sub-compressed, yellowish-white but not chalky on the surface, with a short mealy fracture, hot taste and agreeable aroma. Powder yellowish-white.

Active principle.—A volatile oil and a soft acrid resin.

Action.—Stimulant, and carminative.

Dose.—5 to 10 or 15 grs.

Tinctura zingiberis.—Reddish colour and having the odour and taste of ginger.

Dose.—15 to 60 minims.

Tinctura zingiberis fortior.—Brownish red, with the strong pungent taste and the odour of ginger.

Dose.—5 to 20 minims.

Syrupus zingiberis.—Reddish with the taste and odour of ginger.

Dose.—1 to 2 drs.

CARDAMOMUM.—*Syn.*—*Hind.* Ilayechi; *Dak.* Ilachi; *Tam.* Ela-kay; *Tel.* Ela-kaya; *Can.* Yalakki; *Beng.* Elachi. The dried capsules of the Malabar cardamom, *Elettaria cardamomum.*

Characters.—Seeds obtusely angular, corrugated, reddish-brown, internally white, with a warm aromatic agreeable taste and odour; contained in ovate-oblong triangular pale-brown coriaceous ribbed pericarps.

Action.—Carminative and stimulant.

TINCTURA CARDAMOMI COMPOSITA.—Reddish and clear tincture, having an aromatic odour and warm pleasant taste.

Dose.—$\frac{1}{2}$ to 2 drs.

N. O. LVIII. IRIDACEÆ.

The Iris family.

203. **CROCUS.**—Saffron. The dried stigma and style of *Crocus sativus* cultivated in Spain, France and Italy.

Characters.—Thread-like styles, each terminated by three long orange-brown stigmas, broadest at the summit. Odour strong aromatic. Rubbed on the wet finger it leaves an intense orange yellow tint. When pressed between folds of white filtering paper, it leaves no oily stain.

Action.—Only used as a flavouring and colouring agent, in various officinal preparations.

N. O. LIX. GRAMINACEÆ.

The Grass family.

204. **SACCHARUM PURIFICATUM.**—Refined sugar. Pure cane sugar made from the juice of *Saccharum officinarum,* the common sugar cane. Cultivated in the East and West Indies, and other tropical countries.

Characters.—Compact crystalline conical loaves, known in commerce as lump sugar.

Action.—Demulcent and nutritive.

SYRUPUS.—A watery solution of refined sugar.

THERIACA.—Treacle. The uncrystallised residue of the refining of sugar.

Characters.—A thick brown fermentable syrup, very sweet, not crystallising by rest or evaporation. Specific gravity about 1·40. Nearly free from empyreumatic odour or flavour.

Action.—Demulcent and nutritive. Employed in making pills, and forms an excellent excipient as it keeps the mass soft for a long time.

HORDEUM DECORTICATUM.—Pearl Barley. The husked seeds of *Hordeum distichon;* cultivated in various parts of the world.

Characters.—White, rounded, retaining a trace of the longitudinal furrow.

Action.—Demulcent and nutritive; given chiefly in the form of Decoction, freely as required.

FARINA TRITICI.—Wheaten Flour. The grain of wheat *Triticum vulgare,* ground and sifted.

Action.—Demulcent and nutritive; used in making poultices, &c.

AMYLUM.—Starch made from the flour of wheat. White columnar masses. When rubbed in a wedgewood mortar with a little cold distilled water, it is neither acid nor alkaline to test-paper, and the filtered liquor does not become blue on the addition of solution of iodine. Mixed with boiling water and cooled it gives a deep blue colour with iodine. Used as a dusting powder in excoriations, &c., also in making the *Mucilago amyli* and *Glycerinum amyli.* The mucilage forms a convenient vehicle for enemas, and the glycerine is used in skin diseases as a soothing application.

N. O. LX. FILICES.

The Fern family.

205. **FILIX MAS.**—The male fern. The dried rhizome, with the bases of the foot stalks and portions of the root fibres, of *Aspidium filix-mas,* a native of England.

Characters.—Tufted, scaly, greenish-brown; powder greenish yellow, with a disagreeable odour, and a nauseous bitter somewhat astringent taste.

Active principle.—An oleo-resin.

Action.—Anthelmintic; used in cases of tape-worm.

Extractum filicis liquidum.—An oily looking, semi-fluid extract of a brownish green colour, and odour of ether.

Dose.—15 to 30 minims in emulsion.

N. O. LXI. LICHENES.

The Lichen family.

206. **Cetraria.**—The lichen *Cetraria islandica*, a native of the North of Europe.

Characters.—Foliaceous, lobed, crisp, cartilaginous brownish-white, paler beneath; taste bitter and mucilaginous. A strong decoction gets gelatinous on cooling.

Action.—Demulcent and nutritive used in the form of Decoction, of which the dose is from 1 to 3 ounces.

N. O. LXII. FUNGI.

The Fungus family.

207. **Ergota.**—Ergot. The compact mycelium or spawn of *Claviceps purpurea*, produced within the paleæ of the rye, *Secale cereale.*

Characters.—Sub-triangular, curved, with a longitudinal furrow on the concave side, obtuse at the ends; from $\frac{1}{3}$ inch to $1\frac{1}{2}$ inch in length; of a violet brown colour on the surface, pinkish within, solid frangible, fracture short, odour faintly marked, but strong if the powder be triturated with solution of potash.

Active principle.—Two alkaloid principles *Ecbaline* and *Ergotine* and a fixed oil.

Action.—Has a special stimulant action on the muscular tissue of the uterus, causing the organ to contract. Emmenagogue.

Dose.—20 to 30 grs.

Tinctura ergotæ.—Reddish brown, somewhat disagreeable smell and taste like ergot.

Dose.—10 to 60 minims.

Extractum ergotæ liquidum.—Reddish-brown liquid, with but little of the taste and smell of the ergot.

Dose.—10 to 30 minims.

III.—ANIMAL MATERIA MEDICA.

I. ANNELIDA.

208. **HIRUDO.**—The Leech. 1 *Sanguisuga medicinalis* the speckled leech. 2 *Sanguisuga officinalis* the green leech. Collected in Spain, France, Italy and Hungary. (Various undetermined species of leeches are used in India for medicinal purposes.)

Characters.—Body elongated 2 or 3 inches long, tapering to each end, plano-convex, wrinkled transversely; black olive-green with six rusty-red longitudinal stripes. 1. Belly greenish yellow, spotted with black; 2 Belly olive green not spotted.

Uses.—Used for local abstraction of blood, and 1 leech is supposed to draw from $1\frac{1}{2}$ drs. to 2 drs. of blood, exclusive of what flows after its removal. Before using leeches the part of the skin to which they are to be applied should be carefully washed, with clean water, and dried. The leeches should then be taken out of the water or vessel in which they have been kept, gently dried with a clean towel, and put on the part from which the blood is to be abstracted. If they do not bite readily, dry them once more gently with a clean towel and, making a crease in half a sheet of note paper, put a leech in the crease with its head protruding, and apply the head to the patient's skin. Should this not succeed in causing leeches to bite, it may be presumed either that the leeches are inferior, or that the patient's skin has not been made sufficiently clean. The leech drops off when it has gorged itself with blood, and must never be forcibly removed. Should it be necessary to take it off before it is full, a few grains of common salt dropped on its body will cause it to let go its hold immediately. Excessive or long continued hæmorrhage from leech bites may be stopped by pressure, or the application of matico, nitrate of silver, tincture of perchloride of iron or other

styptics. In children leeches should always be applied over a bone, so as to permit of adequate pressure being applied in case of excessive hæmorrhage from the bites, which is not uncommon. The Indian leeches are generally supposed to abstract more blood than the European species, and allowance must be made accordingly.

II. COLEOPTERA.

The beetle family.

209. CANTHARIS.—The dried beetle *Cantharis vesicatoria*; collected chiefly in Hungary.

Characters.—From 8 to 10 lines long, furnished with 2 wing-covers of a shining metallic green colour, under which are 2 membranous transparent wings; odour strong and disagreeable; powder greyish brown, containing shining green particles. Free from mites.

Active Principle.—A principle *Cantharidin.*

Action.—Internally a powerful diuretic, but to be used with great caution. In over-doses an acrid poison. Externally it is counterirritant and vesicant, and is used in the form of *emplastrum* or the more elegant *charta epispastica.* Blisters are attended with risk in the case of debilitated persons, and young children. The pain of a blister may be much mitigated, by removing it when it begins to vesicate and applying a soft, slightly warm, poultice smeared with sweet oil. The vesicle should be cut with a scissors at the most depending point, and the surface dressed with simple ointment. If the part is to be kept open savin ointment may be applied. Sometimes a blister causes strangury. The remedies for this are diluents and aqua camphoræ.

Dose.—One to two grains of the powder; but more generally used in the form of tincture.

TINCTURA CANTHARIDIS.—A tincture of a straw colour.

Dose.—5 to 20 minims.

ACETUM CANTHARIDIS.—A fluid of a bright brown colour, having a very pungent odour. A vesicant.

EMPLASTRUM CANTHARIDIS.—A soft dark-brown plaster, simply requiring pressure to spread it.

Emplastrum calefaciens.—Of a dull yellowish colour.

Liquor epispasticus.—A greenish brown fluid having a somewhat pungent odour. A vesicant.

Unguentum cantharidis.—An olive-brown ointment.

MYLABRIS.—The dried insect *Mylabris cichorii*, common in various parts of India.

Characters—About 1 inch long, and $\frac{2}{3}$ inch broad; wing-covers of a yellowish colour with 3 large waved transverse bands. First band interrupted and sometimes reduced to 3 or 4 spots.

Active principle.—*Cantharidin.*

Action.—Is not so suitable for internal administration as cantharides. As a rubefacient and vesicant, in the forms of the acetum and emplastrum, it is employed as a substitute for cantharides in Indian hospitals.

III. HYMENOPTERA.

210. **MEL.**—A saccharine secretion deposited in the honeycomb, by *Apis mellifica* the Hive Bee. The honey and wax used in India are the products of indigenous bees, *Apis socialis*, *A. dorsata A. nigropennis* and *A. bicolor.*

Characters.—When fresh from the honey-comb, it is a viscid translucent liquid, of a brownish-yellow colour, which gradually becomes crystalline and opaque. It has a peculiar heavy odour and a very sweet taste. Boiled with water for 5 minutes and allowed to cool it does not become blue with solution of iodine.

Action.—Emollient and demulcent; used chiefly to cover the taste of and to impart its flavour to disagreeable medicines.

Mel depuratum.—Honey purified by melting it over a water-bath, and straining it through flannel while hot.

CERA FLAVA.—The prepared honey-comb of the Hive Bee, *Apis mellifica.*

Characters.—In firm cakes, yellowish, breaking with a granular fracture and having a honey-like odour. Not unctuous to the touch, does not melt under 140°; yields

nothing to cold rectified spirit, but is entirely soluble in oil of turpentine. Boiling water in which it has been agitated, is not when cooled, rendered blue by iodine.

Action.—Emollient and demulcent; extensively used as a constituent of plasters and ointments.

IV. HEMIPTERA.

211. COCCUS.—The dried female insect *Coccus cacti;* reared in Mexico and Teneriffe.

Characters.—Ovate, plano-convex, about 2 lines long, wrinkled, black or greyish white; yields when crushed a pure coloured powder. The greyish-white insect quickly becomes black when warmed before the fire.

Action.—Useful merely as a colouring agent.

TINCTURA COCCI.—Of a beautiful lake colour.

Dose.—30 to 90 minims.

V. PISCES.

Fish.

212. OLEUM MORRHUÆ.—The oil extracted from the fresh liver of *Gadus morrhua*, the cod-fish, by the application of heat.

Characters.—Pale-yellow, with a slight-fishy odour and bland fishy taste. A drop of sulphuric acid added to a few drops of the oil on a porcelain slab developes a violet colour, which soon passes to a yellowish or brownish-red.

Action.—Nutritive and alterative; an invaluable remedy in tubercular affections and scrofulous diseases.

Dose.—1 to 8 drs. in some aromatic water, a little beer or ginger wine. A good means of concealing the taste is to place a small pinch of salt on the tongue, just before taking the oil. The dose should be small at first and gradually increased.

VI. AVES.

Birds.

213. ALBUMEN OVI.—Egg albumen. The liquid white of the egg of *Gallus banckiva* var. *domesticus*.

Action.—Demulcent nutritive. Used in pharmacy, and as an antidote in poisoning by corrosive sublimate, &c.

OVI VITELLUS.—Yolk of egg. The yolk of the egg of *Gallus banckiva* var. *domesticus*.

Action.—Demulcent and nutritious, chiefly used as an ingredient in Mistura spiritus vini gallici, Brandy mixture.

MAMMALIA.

VII. CETACEA.

214. **CETACEUM.**—Spermaceti. Nearly pure cetine obtained, mixed with oil, from the head of the sperm whale, *Physeter macrocephalus*, inhabiting the Pacific and Indian oceans. It is separated from the oil by filtration and pressure, and afterwards purified.

Characters.—Crystalline, pearly-white, glistening, translucent, with little taste or odour, reducible to powder by the aid of a little rectified spirit. Scarcely unctuous to the touch; does not melt under 100° Fhr.

Action.—Demulcent and emollient.

UNGUENTUM CETACEI.—A soft cream-coloured ointment of a bland character.

VIII. RUMINANTIA.

215. **MOSCHUS.**—Musk. The inspissated and dried secretion from the preputial follicles of *Moschus moschiferus*; a native of the mountains of central Asia.

Characters.—In irregular reddish-black rather unctuous grains; having a strong peculiar very diffusible odour, and a bitter aromatic taste; contained in a round or slightly oval membranous sac, about 2 inches in diameter, covered on the outer side with stiff greyish hairs arranged in a concentric manner around its central orifice.

Action.—Stimulant and antispasmodic. Used in the low stages of febrile diseases as a stimulant, and in various nervous affections as an antispasmodic.

Dose.—5 to 10 grs.

SEVUM PRÆPARATUM.—Prepared suet. The internal fat of the abdomen of the sheep, *Ovis aries*, purified by melting and straining.

Characters.—White, smooth, almost scentless; fusible at 103° Fhr.

Action.—Emollient.—Used as an ingredient in pharmaceutical preparations.

LAC.—Milk. The fresh milk of the cow *Bos taurus.*

Action.—Demulcent and highly nutritious. Used in making mistura scammonii.

SACCHARUM LACTIS.—Sugar of milk. A crystallized sugar, obtained from the whey of milk by evaporation.

Characters.—Usually in cylindrical masses, 2 inches in diameter, with a cord or stick in the axes, or in fragments of cakes; greyish-white, crystalline on the surface and in its texture, translucent, hard, scentless, faintly sweet, gritty when chewed.

Action.—Nutritive, used for sweetening cow's milk as food for children. In pharmacy employed for rubbing down powders which require to be carefully and minutely divided.

Dose.—60 to 80 grs.

FEL BOVINUM PURIFICATUM.—Purified ox bile. The purified gall of the ox, *Bos taurus.* Take of

Fresh ox bile	1 pint.
Rectified spirit	2 pints.

mix the bile and the spirit by agitation in a bottle, and set aside for twelve hours until the sediment subsides. Decant the clear solution, and evaporate it in a porcelain dish by the heat of a water bath, until of a suitable consistence for making pills.

Characters.—Yellowish-green substance, having a taste partly sweet, and partly bitter, soluble in water and in spirit. A solution of 1 or 2 grs. in about 1 dr. of water, when treated, first with a drop of freshly made syrup, consisting of 1 part of sugar and 4 of water, and then with sulphuric acid added cautiously until the precipitate at first formed is redissolved, gradually acquires a cherry-red colour, which changes in succession to carmine, purple and violet. Its watery solution gives no precipitate on the addition of rectified spirit.

Action—Tonic and laxative, used in cases of dyspepsia with a deficiency of bile.

Dose.—5 to 10 grs. should be given in pills coated with tolu dissolved in ether.

IX. PACHYDERMATA.

216. PEPSIN.—A preparation of the mucous lining of a fresh and healthy stomach of the pig, sheep, or calf.

Characters and tests.—A light yellowish brown powder, having a faint, but not disagreeable odour, and a slightly saline taste, without any indication of putrescence, very little soluble in water or spirit.

Action.—Renders the nitrogenous parts of food soluble, and is the active principle of digestion in mammals. It is given in dyspepsia to aid weak digestion. A convenient form is the wine, a solution of pepsin in sherry.

Dose.—2 to 5 grs., and of the *Vinum pepsinæ* 1 to 4 teaspoonfuls, with each meal containing nitrogenous food.

ADEPS PRÆPARATUS.—Prepared lard. The purified fat of the hog, *Sus scrofa.*

Characters.—A soft white fatty substance melting at about 100° Fhr. Has no rancid odour, and dissolves entirely in ether. Distilled water in which it has been boiled, when cooled and filtered, gives no precipitate with nitrate of silver, and is not rendered blue by the addition of solution of iodine.

Active principles.—Contains about 62 per cent. of *Oleine*, and 38 of *Margarine* and *Stearine.*

Action.—Emollient and nutritious, used only externally. Cannot be used for Mahommedan patients on account of their religious scruples. Is an unsatisfactory preparation in India, being fluid and generally rancid.

Preparations.

Adeps benzoatus and 14 of the officinal ointments.

ADEPS BENZOATUS.—Benzoated lard. Take of prepared lard 1 pound, benzoin, reduced to powder, 160 grs. Melt

the lard over a water bath, add the benzoin and, frequently stirring them together, continue the application of heat for 2 hours; finally remove the residual benzoin by straining.

Action.—Emollient, keeps better than the lard. Much used in preparation of ointments and suppositories.

X. RODENTIA.

217. **CASTOREUM.**—Castor. The dried preputial follicles and their secretion, got from the Beaver, *Castor fiber*, and separated from the somewhat shorter and smaller oil sacs which are frequently attached to them. From Hudson's Bay territory, North America.

Characters.—Follicles in pairs about 3 inches long, figshaped, firm, and heavy, brown or greyish-black; containing a dry resinous reddish-brown or brown highly odorous secretion, in great part soluble in rectified spirit, and in ether.

Active principles.—Contains a *resin*, a *volatile oil*, and a crystallizable principle *Castorin*.

Action.—Antispasmodic and stimulant.

Dose.—5 to 10 grs.

TINCTURA CASTOREI.—A brownish red tincture.

Dose.—½ to 1 dr.

IV.—PRODUCTS OF FERMENTATION, &c.

SPIRITUS RECTIFICATUS.—Rectified Spirit. Alcohol, C_2H_6O, with sixteen per cent. of water; obtained by the distillation of fermented saccharine fluids.

Characters and Tests.—Colourless, transparent, very mobile and inflammable, of a peculiar pleasant odour, and a strong spirituous burning taste. Burns with a blue flame without smoke. Specific gravity 0·838. Remains clear when diluted with distilled water. Odour and taste purely alcoholic. Four fluid ounces with thirty grain measures of the volumetric solution of nitrate of silver exposed for twenty-four hours to bright light, and then decanted from the black powder which has formed, undergoes no further change when again exposed to light with more of the test.

Tinctures made with Rectified Spirit.

Tinctura Aconiti.
,, Arnicæ.
,, Assafœtidæ.
,, Benzoini composita.
,, Cannabis Indicæ.
,, Capsici.
,, Castorei.
,, Cubebæ.
,, Ferri Perchloridi.
,, ,, Acetatis.
,, Iodi.

Tinctura Kino.
,, Lavandulæ composita.
,, Myrrhæ,
,, Nucis Vomicæ.
,, Opii Ammoniata.
,, Pyrethri.
,, Tolutana.
,, Veratri Viridis.
,, Zingiberis.
,, ,, fortior.

Rectified spirit consists of absolute alcohol diluted with 16 per cent. of water. As indicated in the pharmacopœia definition, it is made by the distillation of fermented saccharine fluids. To get alcohol from a solution of sugar it is necessary to add some ferment, such as the yeast plant, contained in *Cerevisiæ fermentum*, and to keep the solution at a temperature of from 70° to 75°. In due course the liquid gets turbid and frothy, and emits carbonic acid gas.

When fermentation has ceased it will be found, that the sugar has disappeared and that alcohol, which can be separated by distillation, has been formed. The art of distillation has long been known and practised in the east, and Arrack is made from rice, and Rum from cane sugar in India. In Europe spirits are made from malted barley, potatoes, and raw grain, but the latter contain much of the deleterious substances known as *fusel* or *fousel-oil.* The specific gravity of rectified spirit is 0·838 and it is spoken of as 56 per cent. *over proof.* The origin of the term *proof spirit* is due to the circumstance, that in old times the strength of a spirit was tested by moistening a small quantity of gunpowder with it, and setting fire to the alcohol. If the gunpowder took fire, the spirit was said to be above or over proof, but if, owing to the water present, the powder was too moist to burn the spirit was termed under proof. The weakest spirit answering to this test is of the spec. grav. 0·920, at a temperature of 60° F. When tested by the hydrometer (*see p.* 11) if the spec. grav. be under 0·920 the spirit is said to be over proof, if higher than 0·920 it is defined as under proof. The excise system in England and India fixes a spirit of the density of 0·920 as the standard for its zero, and the *number* over proof indicates the percentage of water, and the *number* under proof the amount of alcohol, that must be added to bring the sample to the density of proof spirit. If a spirit, for instance, be 11 over proof, that indicates that 100 volumes of it will require 11 volumes of water to reduce it to proof standard. The specific gravity test is intended to determine the strength of the spirit, and the other pharmacopœia tests to ascertain the amount of *fusel-oil* it may contain. Rectified spirit is used in a number of pharmaceutical processes.

Action.—Is a powerful solvent of resins, balsams, &c., and much used in the arts. Externally it produces cold by evaporation. Internally it is a diffusible stimulant.

SPIRITUS TENUIOR.—Proof spirit.

Take of

Rectified Spirit ... ... 5 pints.
Distilled Water ... ... 3 „

Mix.

Test.—Specific gravity 0·920.

Action.—Proof spirit is extensively used as a solvent in pharmacy, being the menstruum in the majority of tinctures. It is also used as a lotion. Its medicinal properties are similar to those of Rectified Spirit.

218. **SPIRITUS VINI GALLICI.**—Brandy.

Spirit distilled from French wine. It has a peculiar flavour, and a light sherry colour derived from the cask in which it has been kept.

Action.—100 parts contain about 50 by volume of alcohol, with some volatile oil and an ether. It is a convenient diffusible stimulant. In this country a good substitute will be found in sound arrack. In some cases Gin, Hollands or Whisky may prove specially useful. Gin has diuretic properties, and good Whisky is devoid of sugar and fusel-oil.

MISTURA SPIRITUS VINI GALLICI.—A yellowish mixture with a pleasant flavour of spirit and cinnamon.

Dose.—½ to 1½ oz.

VINUM XERICUM.—Sherry. A Spanish wine.

Characters.—Pale yellowish brown, containing about seventeen or eighteen per cent. of alcohol.

Preparations.

Vinum aloes.	Vinum ipecacuanhæ.
,, antimoniale.	,, opii.
,, colchici.	,, rhei.
,, ferri.	

Action.—A useful tonic and stimulant. Is used in the preparation of all the officinal wines except the *Vinum aurantii*, *Vinum ferri citratis*, and *Vinum quiniæ*.

Dose ½ to 4 ozs.

CEREVISIÆ FERMENTUM.—Beer Yeast. The ferment, obtained in brewing beer.

Characters.—Viscid, semifluid, frothy, exhibiting under the microscope numerous round or oval confervoid cells.

Action.—Antiseptic and stimulant.

Dose.—½ to 1 oz.

CATAPLASMA FERMENTI.—Yeast poultice.

Action.—Useful for foul, sloughing or irritable ulcers.

ALCOHOL AMYLICUM.—Amylic alcohol or Fousel-oil. Amylic alcohol $C_5 H_{12} O$, with a small proportion of other spirituous substances.

Characters and Tests.—A colourless liquid with a penetrating and oppressive odour, and a burning taste. When pure its specific gravity is ·818, and its boiling point 270°. Sparingly soluble in water, but soluble in all proportions in alcohol, ether, and essential oils. Exposed to the air in contact with platinum black it is slowly oxidised, yielding valerianic acid.

Preparation.—Sodæ valerianas.

219. **AMYL NITRIS.**—$C_5 H_{11} NO_2$ Nitrite of Amyl. Produced by the action of nitric or nitrous acid on amylic alcohol.

Characters and Tests.—An ethereal liquid of a yellowish colour, and peculiar, not disagreeable odour. Specific gravity, 0·877. Boiling point, 205°. Insoluble in water. Soluble in rectified spirit in all proportions. If it be added drop by drop to caustic potash while fused by the application of heat, valerianate of potash will be formed.

Action.—Diminishes vascular tension, by reducing arterial resistance, and appears to act directly on the vessels and not through the vaso-motor nerve centres. When inhaled it increases both the frequency and force of the heart's action, the rate of the pulse being doubled in a few seconds. The face also flushes, the carotids throb and there is a sense of tingling experienced all over the surface of the body. If too large a dose be given, it produces convulsions. It is of great use in relieving the pains of angina pectoris, and has also been employed in sea-sickness, nervous headache, &c. It must, owing to its tendency to cause fulness in the head, &c., be used with great caution. The best mode of administering it, is to put two or three drops on a piece of blotting-paper folded like a cone, and to apply this over the patient's nose.

Dose.—2 to 5 minims by inhalation: to be used with caution.

220. **ÆTHER.**—Ether. Æther sulphuricus *Edin.*, *Dubl.* A volatile liquid prepared from alcohol, and containing not less than 92 per cent. by volume, of pure ether, $C_4 H_{10} O$.

Characters and Tests.—A colourless very volatile and inflammable liquid, emitting a strong and characteristic odour, and boiling below 105°. Specific gravity 0·735. Fifty measures agitated with an equal volume of water are reduced to 45, by an absorption of 10 per cent. It evaporates without residue.

Preparations

Æther Purus

Collodium	6 volumes in 8 nearly.
„ Flexile	6 „ in 8 „
Liquor Epispasticus	4 „ in 5 „
Spiritus Ætheris	1 volume in 3 „

Action.—Given by mouth it is a diffusible stimulant, but its action is brief. Is used as an anæsthetic, and has some advantages and disadvantages as compared with chloroform. For further remarks on its anæsthetic properties, see page 110. When applied externally, it produces, in consequence of its rapid evaporation, intense cold, and it is therefore often used as a local anæsthetic in the extraction of teeth and other minor operations. Æther given internally is also antispasmodic and sedative.

Dose.—20 to 40 minims.

ÆTHER PURUS.—$C_4H_{10}O$. Pure ether free from water and alcohol, and of specific gravity not exceeding 0·720.

Action.—Is used for producing anæsthesia, for which purpose about 2 ozs. or more will be required.

SPIRITUS ÆTHERIS.—Spirit of Ether or Hoffman's Anodyne Spirit.

Take of

Ether	10 fluid ounces.
Rectified Spirit	1 pint.

Mix.

Test.—Specific gravity 0·809.

Preparation.—Tinctura Lobeliæ ætherea.

Action.—Transient stimulant and an antispasmodic.

Dose.—30 to 60 minims in Camphor water.

221. ÆTHER ACETICUS.—Acetic Ether. $C_2H_5C_2H_3O_2$.

May be obtained by distilling a mixture of eight parts of dry acetate of soda, five parts of rectified spirit, and ten parts of sulphuric acid; adding the distilled product to half its weight of chloride of calcium in a stoppered bottle; letting them remain together for twenty-four hours, and then decanting and rectifying the ethereal liquid.

Characters and Tests.—A colourless liquid with an agreeable ethereal odour. Specific gravity, 0·900. Boiling point, 166°. So-

luble in all proportions in rectified spirit and in ether. One part dissolves in 11 or 12 parts of water at 60°.

Action.—A pleasant antispasmodic and diffusible stimulant.

Dose.—20 to 60 minims.

222. SPIRITUS ÆTHERIS NITROSI.—Spirit of Nitrous Ether. Spiritus Ætheris Nitrici *Lond.*, *Edin.* A spirituous solution containing nitrous ether $C_2H_5NO_2$.

Characters and Tests.—Transparent and nearly colourless, with a very slight tinge of yellow, mobile, inflammable, of a peculiar penetrating apple-like odour, and sweetish cooling sharp taste. Specific gravity, 0·845. It effervesces feebly or not at all, when shaken with a little bicarbonate of soda. When agitated with solution of sulphate of iron and a few drops of sulphuric acid it becomes deep olive brown or black. If it be agitated with twice its volume of saturated solution of chloride of calcium in a closed tube, two per cent. of its original volume will separate in the form of nitrous ether and rise to the surface of the mixture.

Action.—A very useful diuretic, and is also stimulant, and diaphoretic. Is an invaluable remedy in the gripes of infants and children, giving speedy relief and being much less liable to cause derangement of the digestive organs, than the essential oils usually employed.

Dose.—½ to 2 drs.

223. CHLOROFORMUM.—Chloroform. $CHCl_3$.

Characters and Tests.—A limpid colourless liquid, of an agreeable ethereal odour, and sweet taste. Dissolves in alcohol and ether in all proportions; and slightly in water, communicating to it a sweetish taste. Burns, though not readily, with a green and smoky flame. Specific gravity 1·49. It is not coloured by agitation with sulphuric acid, leaves no residue and no unpleasant odour after evaporation.

Preparations.

Linimentum chloroformi	1 volume	in 2.
Spiritus chloroformi	1 „	in 20.
Tinctura chloroformi composita ...	1 „	in 10.

Action.—Internally antispasmodic, sedative and narcotic. Applied externally it acts as a counter-irritant. Administered in the form of vapour it is anæsthetic and full instructions as to its use will be found at page 109. It is given internally in neuralgia, sea-sickness, and for irritability of stomach, colic, asthma, &c. Locally it is used to relieve toothache, earache, rheumatic pains, neuralgia, &c. As an

anæsthetic it is of great value in midwifery, but it is better not to give it till nearly the close of the first stage of labour. It should only be given *during the pains*, and the best way to administer it is to put a small dose on a folded handkerchief, and to allow the patient to apply this to her own mouth and nose, care being taken that the handkerchief is not pressed down too tightly, so as to completely exclude air. By this mode of administration there is but little risk incurred, as the patient drops the handkerchief as the drug takes effect, and the medical man is left free to attend to the case. Complete anæsthesia is not induced in this way, but insensibility sufficient to relieve, to a great extent, the agony of the pains.

Dose.—1 to 12 minims in syrup, mucilage or a little brandy mixed with water.

LINIMENTUM CHLOROFORMI.—Yellow colour.

TINCTURA CHLOROFORMI.—Brown colour.

Dose.—20 to 60 minims.

224. CHLORAL HYDRAS.—Hydrate of Chloral. $C_2HCl_3O \cdot H_2O$.

Chloral, produced by the action of dry chlorine gas on anhydrous alcohol, purified by treatment, first with sulphuric acid and afterwards with a small quantity of lime, and finally converted into the solid hydrate by the addition of water.

Characters and Tests.—In colourless crystals, which do not deliquesce on exposure to air. It has a pungent but not an acrid odour, and a pungent and rather bitter taste. On the application of a gentle heat it fuses to a colourless transparent liquid, which, as it cools, begins to solidify at a temperature of about 120°. It boils in a test-tube, with pieces of broken glass immersed in it, at about 205°, and at a slightly higher temperature it volatilises on platinum foil without residue. Soluble in less than its own weight of distilled water, rectified spirit, or ether, and in four times its weight of Chloroform. The aqueous solution is neutral or but slightly acid to test-paper. A solution in Chloroform when mixed by agitation with sulphuric acid, does not impart colour to the acid. 100 grains of hydrate of chloral dissolved in an ounce of distilled water and mixed with 30 grains of slaked lime, submitted to careful distillation with a suitable apparatus, should yield not less than 70 grains of chloroform.

Action.—An efficient hypnotic and sedative, and of great value in nervous sleeplessness, mania, hypochondriasis,

chorea, delirium tremens, neuralgia, tic-douloureoux, heart-disease, night-sweats of phthisis, asthma, idiopathic tetanus, &c. Must be given with caution, as a dose so low as 50 grains has proved fatal. If its use be long continued, it may produce such symptoms as congestion of the mouth, fauces and conjunctivæ, loss of appetite, irregularity of the bowels, skin eruptions, weak action of the heart, and finally insomnia and delirium. Patients should, therefore, be warned against its too free or continued use.

Dose.—10 to 60 grains.

Synonym.—Phenic Acid.

225. **ACETUM.**—Vinegar. An acid liquid prepared from malt and unmalted grain by the acetous fermentation.

Characters.—A brown liquid with a peculiar odour. Spec. grav. 1·017 to 1·019.

Action.—Antiseptic, refrigerant, and astringent. Used for sponging the body to reduce the temperature, as lotion for bruises, &c.

Dose.—1 to 2 drs. diluted.

ACIDUM ACETICUM.—Acetic acid. Prepared from wood by destructive distillation.

Characters.—A colourless liquid having a strong acid reaction and a pungent odour. Spec. grav. 1·044.

Action.—The same as vinegar, but is only used in the preparation of other medicines.

ACIDUM ACETICUM DILUTUM.—Dilute acetic acid. Made by adding 7 parts of water to 1 of acetic acid.

Characters.—Spec. grav. 1·006.

Action.—Like vinegar refrigerant, and antiseptic.

Dose.—1 to 2 drs.

226. **OXYMEL.**—Oxymel, a brown fluid made by mixing forty parts of honey with 5 parts of acetic acid, and 5 of distilled water.

Action.—Forms a pleasant and useful addition to gargles and expectorants. Is also used as a refrigerant when mixed with Barley-water.

Dose.—1 to 2 drs.

227. **ACIDUM ACETICUM GLACIALE.**—Glacial acetic acid. Concentrated acetic acid corresponding to at least 84 per cent. of anhydrous acid, $C_4 H_6 O_3$.

Characters.—It crystallises when cooled to 31°, and remains crystalline until the temperature rises to above 48°. Spec. grav. 1·065 to 1·066 and this is increased by adding ten per cent. of water. at the mean temperature of the air it is a colourless liquid with a pungent acetous odour.

Action.—Caustic and vesicant. Used for the destruction of corns and warts. As a vesicant it causes much pain and must be used with caution, otherwise it may produce a troublesome sore. Useful for the destruction of syphilitic vegetations, nævi, &c. Is used in vinaigrettes with the addition of some perfume. It is three times as strong as acetic acid and dissolves gum-resins, camphor and volatile oils.

228. **ACIDUM CARBOLICUM.**—Carbolic Acid. HC_6H_5O.

An acid obtained from coal-tar oil by fractional distillation and subsequent purification.

Characters and Tests.—In colourless acicular crystals, which at a temperature of 95° become an oily liquid, having a strong odour and taste, resembling those of creasote, which it also resembles in many of its characters and properties. Its specific gravity is 1·065; boiling point, 370°. The crystals readily absorb moisture on exposure to the air, and they are thus liquefied; the acid, however, is but slightly soluble in water, but it is freely soluble in alcohol, ether and glycerine. It does not redden blue litmus paper. A slip of deal dipped into it, and afterwards into hydrochloric acid, and then allowed to dry in the air, acquires a greenish-blue colour. It coagulates albumen. It does not affect the plane of polarisation of a ray of polarised light.

Preparation.

Glycerinum Acidi Carbolici... 1 part in 6 by weight.

Action.—Is largely used as a disinfectant and antiseptic. It is one of the most powerful and useful of disinfectants, and is invaluable as an antiseptic in surgery. Applied to the skin or mucous surfaces it is caustic, and is used for treating poisoned wounds, to destroy piles, in diphtheria, carbuncle, chancre and foul ulcers. For information as to the forms in which it is used as an antiseptic in surgery, see the article *antiseptics*. To Professor Lister is due the credit of having introduced its use into surgery, and he believes its efficacy to be due to its power of destroying

atmospheric germs, which coming in contact with the wound would set up a putrefactive process. Internally it is given to check diarrhœa, as a vermifuge, in pyæmia, typhoid fever, scarlatina and small-pox. It is also used as a gargle, as an application to indolent ulcers, in parasitic and other skin diseases, and as an injection in gonorrhœa and gleet. As a disinfectant it is of great use in sick rooms being volatile, and it is much more energetic than most other articles of this class and therefore largely used in houses, drains, &c.

Dose.—1 to 3 grs. in water or pill; as a lotion 1 part in 20 of water or oil; as a weak lotion 1 part to 100 of water; as a gargle 2 grs. to 1 oz. of water; and for inhalation of vapour 15 grs. to the pint of hot water.

229. **CREASOTUM.**—Creasote.

Characters.—A liquid, colourless or with a yellowish tinge, and a strong empyreumatic odour. Sparingly dissolved in water, but freely by alcohol, ether, and glacial acetic acid; specific gravity, 1·071. It Coagulates albumen.

Preparations.

Mistura Creasoti	1 min. in 1 oz.
Unguentum "	1 part in 9 "
Vapor "	

Action.—Astringent, escharotic, styptic, sedative and antiseptic. Used externally for skin diseases; and internally to allay thirst in diabetes, for sea-sickness, nausea of pregnancy, as a gargle, &c.

Dose.—1 to 3 min. in pill of bread crumb, or made into emulsion with mucilage. The mixture is the best form for internal administration.

UNGUENTUM CREASOTI.—Cream coloured.

2nd.—TERMS USED TO DENOTE THE ACTIONS OF MEDICINES, THE CLASSIFICATION OF MEDICINES, Etc.

The actions of medicines are the effects that they produce on the living animal system either in health or in disease; and, as there can be no effect without a cause, so the actions of medicines depend partly on certain powers or forces inherent in the articles themselves, and partly on certain changes effected on them by the action of the living organism. The actions of medicines are conveniently spoken of as physiological and therapeutical, the *physiological action* being the effect which a medicine is capable "of producing in healthy individuals," and the *therapeutical action* the effect produced on disease by the operation of a medicine. Attempts have been made to classify the materia medica according to their physiological action, but it will be sufficient here to notice the groups into which medicines have been arranged, according to the obvious general results or effects of their administration. Great difference of opinion has existed respecting the mode in which the effects of medicines are produced, after their introduction into the system, but it is now pretty generally allowed that all medicines, excepting those having a purely mechanical action, are absorbed, and thus carried to the parts susceptible of their action, and that some of their effects may be due to nervous agency. Assuming this it follows, that medicines to act effectually must either be in a fluid state when administered, or if given in a solid state they must be susceptible of solution in the fluids of the alimentary canal. The following are the groups or classes into which remedies are usually divided.

230. ACIDS.—Acids when taken into the system may act locally as escharotics, astringents or antalkalies, or by absorption as tonics, alteratives, refrigerants, &c. They may be divided into mineral and vegetable.

Mineral Acids.—The chief of these are sulphuric, nitric, hydrochloric and nitro-hydrochloric. All of these, when swallowed undiluted, act as corrosive poisons. When given in a dilute state, they prove antalkaline, astringent, tonic and alterative. Sulphuric acid is the most astringent of this group, and is frequently given with much benefit in diarrhœa. Hydrochloric is the best tonic, as it seems to aid the process of digestion. Nitric acid is tonic, slightly alterative and refrigerant. Nitro-Hydrochloric acid is decidedly alterative, and is frequently used with much advantage in the treatment of chronic disease of the liver. One objection to the use of the mineral acids as internal remedies, is their injurious action on the teeth. This may be partly avoided by giving them in a rather dilute state, and causing the patient to suck the dose through a quill or glass tube.

Vegetable acids.—The most commonly used of these are acetic, tartaric and citric acids. All these are refrigerant, and citric acid is a valuable antiscorbutic. Vegetable acids are much less hurtful to the teeth than the mineral, and not so apt when continued for a length of time to derange the digestive organs. Citric and tartaric acids are frequently used with an alkaline carbonate, to make effervescent draughts. Tartaric acid should not be used for that purpose with bicarbonate of potash, as a bitartrate of the alkali is formed and precipitated. Gallic and tannic acids are valuable astringents.

The officinal acids, belonging to this therapeutical class, are:—

Acidum aceticum.	Acidum nitro-hydrochloricum.
,, citricum.	,, phosphoricum.
,, hydrochloricum.	,, sulphuricum.
,, nitricum.	,, tartaricum.

Also the preparations of these acids.

231. **ALKALIES.**—This is a valuable class of medicines and includes potash, soda, ammonia, lime, magnesia and their carbonates. Alkalies are chiefly used as antacids to correct acidity in the stomach, intestines or urine, and to increase the alkalinity of the blood in rheumatism, gout, &c. Potash compounds act chiefly on the kidneys, soda compounds on the liver, ammonia compounds on fluid or gaseous acids in the alimentary canal, and lime compounds on the intestinal

canal producing constipation. The magnesia compounds also act on the bowels, but have a laxative or purgative effect. When alkalies are given in too large doses, or their use is continued too long, they are apt to have bad effects, the most obvious of which is impairment of digestion. This arises from their neutralizing the acidity of the gastric juice. Such an effect may be partly obviated by prescribing the alkali with some bitter infusion, such as that of chiretta. When an alkali is required with the object of correcting acidity of the intestinal canal, chalk will be found the most suitable, as, not being soluble in the gastric juice, it passes on to and acts directly on the seat of acidity. Alkalies are sometimes employed with good effect to reduce obesity, the best for this purpose being the liquor potassæ. The disagreeable taste of liquor potassæ and liquor calcis may be concealed by prescribing them in milk :—

Ammonia,	Magnesia,
Calx,	Potassa,
Creta,	Soda,
Lithia,	

and their carbonates.

232. **ALTERATIVES.**—Alteratives are medicines which, without producing any immediate and sensible action on the secretions or excretions of the body, gradually relieve any morbid condition of the system or of an organ. All true alteratives produce some alteration in the state of the blood, and thus come to affect the system generally. The most powerful agents of this group are the preparations of mercury, iodine and arsenic. Those of antimony, chlorine and sulphur are less so, and the action of sarsaparilla, hemidesmus, taraxacum, and dulcamara as alteratives seems doubtful. Alteratives are mostly employed for the relief of chronic diseases, and generally require to be given in small doses, and their use continued for some time. During their administration the diet of the patient must be carefully regulated and strict attention paid to clothing, exercise, &c. Mercury and iodine are chiefly used for the cure or alleviation of syphilitic or scrofulous diseases, antimony, arsenic and sulphur in the treatment of obstinate skin diseases, and chlorine compounds, such as the nitro-hydrochloric acid, in chronic diseases of the liver. Bro-

mine would seem to have a somewhat similar action to iodine, and preparations of gold have been employed with advantage as alteratives in secondary syphilis. Cod-liver oil enjoys a great repute as an alterative, but its valuable action in cachetic states would seem to arise more from its tonic and fattening properties, than any decided alterative action. Under its use the digestive organs acquire tone, the secretions are improved, the patient puts on flesh, and the condition of the system generally becomes improved :—

Acidum nitro-hydrochloric:	Iodum.
Ammonii chloridum.	Mezerei cortex.
Antimonium sulphuratum.	Podophylli resina.
Acidum arseniosum.	Potassæ chloras.
Auri terchloridum.	Potassii bromidum.
Bromum.	,, iodidum.
Calcii chloridum.	Sarsa.
Calcis liquor.	Sassafras.
Dulcamara.	Sodæ arsenias.
Ferri iodidum.	Sulphur.
Guaiacum.	Sulphuris iodidum.
Hemidesmus.	Taraxacum.
Hydrargyrum.	Zinci chloridum.
Hydrocotyle Asiatica.	
and their compounds.	

Also *Carlsbad salt* and *Friedrichshall* mineral waters.

233. **ANÆSTHETICS.**—This class includes all medicines which are capable of producing insensibility and preventing pain. They are of various kinds, viz., those which are administered internally to produce general anæsthesia, such as chloroform, ether, and nitrite of amyl, and those which are applied externally to induce local anæsthesia, such as ether spray and ice. The anæsthetics most commonly used for producing insensibility are administered in the state of vapour, and when a patient is fully under the influence of a remedy of this class, the most severe surgical operations may be performed without his being conscious of what is passing, or experiencing the slightest pain. Anæsthetics, therefore, may be said to have deprived the operating room of the horrors that formerly attached to it in the patient's mind, and by relieving him of these and of acute pain while under the surgeon's knife, to have placed him in a much

more favourable position for recovery after an operation. For the mode of administering anæsthetics, see *vapour* para. 106, page 109. The chief agents which are used as general anæsthetics in the state of vapour are chloroform and ether. For local anæsthesia the best agents are ether and ice. When the vapour of an anæsthetic, such as chloroform, is inhaled it first passes into the blood and thus comes to act on the nervous centres. The mind and volition are first overcome, then sensation and motion, and lastly respiration.

Æther, Chloroformum, Amyl Nitris and Nitrous oxide gas.

234. **ANAPHRODISIACS.**—Are medicines which diminish or entirely subdue the sexual feelings. The number of drugs possessing such power is small, and some have denied the existence of any such agents. There cannot be a doubt, however, that bromide of potassium and camphor both possess anaphrodisiac properties. The action of Camphor in this way is celebrated in the apothegm,

"Camphora per nares
Castrat odore mares."

The following is a list of reputed anaphrodisiacs :—

Ammonii bromidum.
Antimonium tartaratum.
Camphora.
Conium.
Hyoscyamus.
Ipecacuanha.
Opium.
Potassii bromidum.
Tabacum.

235. **ANODYNES.**—Are drugs which by their action on the nervous system relieve pain. They are very nearly allied to narcotics, indeed most of the latter class are in small doses anodyne. The chief anodynes are :—

Aconitum.
Actæa racemosa.
Æther.
Amyl nitris.
Ammonii chloridum.
Atropia.
Belladonna.
Cannabis indica.
Chloroformum.
Conium.
Hyoscyamus.
Lactuca.
Lupulus.
Morphia.
Opium.
Stramonium.

236. **ANTHELMINTICS.**—These are substances which kill or cause the expulsion of intestinal worms. They are classified as follows :—

1*st*. *Specific anthelmintics* or *Vermicides* or those which act as poisons to the worms; such as liquid extract of male-fern, kousso, kamala, santonine and oil of turpentine.

2*nd*. *Purgative anthelmintics* or *Vermifuges*, such as calomel, gamboge, scammony, and jalap, which merely expel worms by their purgative action.

The three kinds of intestinal worms, most commonly met with in the human subject are the *Tape-worm*, *Round-worm* and *Thread-worm*. For the tape-worm kousso, extract of male-fern, kamala, areca nut, and pomegranate bark are the best remedies, and for the round-worm santonine. Thread-worms are best exterminated by enemas of turpentine, carbolic acid, common salt, infusion of quassia or tincture of perchloride of iron. Some of the vermicides, such as kamala, are also cathartic, but most of them require to be followed up by a purgative dose so as to expel the dead worms. To persons subject to worms, or who have just had their intestines cleared of them, it is advisable to administer a course of tonics—such as quassia, nux-vomica, or tincture of perchloride of iron—which are sometimes termed *preventive anthelmintics* :—

Aloe.	Mucuna pruriens.
Areca.	Quassia.
Assafœtida.	Rutæ oleum.
Cambogia.	Sabadilla.
Colocynthidis pulpa.	Sabina.
Crotonis oleum.	Santoninum.
Cusso.	Scammonium.
Extractum filicis liquidum.	Sodii chloridum.
Granati radix.	Tabacum.
Jalapa.	Terebinthinæ oleum.
Kamala.	„ confectio.
Kousso.	

237. **ANTISEPTICS.**—Are substances which, by their chemical agency, prevent the decomposition of vegetable and animal tissues, and destroy infection. In some cases they act by forming a chemical combination with one or more of the constituents of the substance to be preserved,

and in other instances by preventing the contact of air. The term antiseptic should, strictly speaking, be confined to articles which operate chemically on organic structures. Carbolic acid has of late years been very extensively used, and with the happiest effects, as an antiseptic in surgery. The credit of introducing this agent for surgical purposes is due to Professor Lister, and it is but fair to say that, since the introduction of anæsthetics, it is the greatest improvement which has taken place in modern surgery. The precise mode of its action in such cases is still a matter of dispute, but the chief advocates of the antiseptic treatment affirm, that its effects are due to the power it possesses of destroying atmospheric germs, which if allowed to come in contact with wounds, sores, &c., exercise an influence altogether opposed to the healing process. The following is the receipt for Lister's *Antiseptic plaster*:—

Shell lac	3 lbs.
Carbolic acid (cryst.) ...	1 lb.

Melt the lac in a covered copper vessel over a fire, along with about a quarter of the carbolic acid. When it is melted, stir in the rest of the acid, strain through muslin and spread by means of a machine upon soft (undressed) calico, taking care that the heat of the material and its weight in the trough of the machine are such, that the plaster does not run through to the other side of the cloth. When it is cold, coat the plaster with a thin film of gutta-percha, by brushing it over with a solution of one part gutta-percha in 30 parts of bisulphide of carbon. Then hang up the plaster for about two days to allow all the sulphide of carbon to escape, as indicated by the absence of its fœtid smell. Then roll with tissue paper interposed, and keep in a close tin vessel. *Antiseptic gauze* is made by dipping the cloth in a hot mixture of 11 parts of carbolic acid, to 58 of resin and 80 of paraffin. Lister's *Carbolic oil* contains 1 part of the acid to 20 of olive oil; *weak carbolic lotion* 1 part of acid in 100 of water; and *strong carbolic lotion* 1 part of acid to 20 of water. A very cheap and efficient antiseptic solution, for preserving animal or vegetable preparations, may be made by adding one part of glycerine to ten of distilled water. The only defect is that a fungus growth is liable to form on the surface of

the solution, but this might be prevented, perhaps, by adding a little carbolic acid :—

Acidum arseniosum.	Carbo ligni.
„ benzoicum.	Chlori liquor.
„ boracicum.	Creasotum.
„ carbolicum.	Ferri sulphas.
„ salicylicum.	Iodum.
„ sulphurosum.	Potassæ nitras.
„ tannicum.	„ permanganas.
Alcohol.	Sodii chloridum.
Alumen.	Sodæ chloratæ liquor.
Calx.	Thymol.
„ chlorata.	Zinci chloridum.
Carbo animalis.	

238. ANTISPASMODICS.—These are agents which relieve or prevent spasm, that is, irregular or inordinate muscular action. The mode in which they operate is not well understood, and all that can be safely said as to their action is, that they excite the circulation and act as sedatives on the nervous system when diseased. This latter effect is probably produced by their stimulating the nerves, so as to induce healthy action. As spasm may be produced by many different causes, so we find that it may be relieved by a number of different remedies capable of removing the source of irritation. Thus a purgative, an anodyne, a stimulant or a tonic may, under certain conditions, become antispasmodic. The term antispasmodic is, however, chiefly confined to medicines which relieve spasm without having any obvious influence upon its exciting cause. Many antispasmodics have a strong disagreeable odour, and they are all remarkable for rapidity of action. Their effects are also temporary, and they lose their influence when frequently repeated :—

Acidum hydrocyanicum.	Camphora.
Æther.	Castoreum.
Ammonia.	Chloral hydras.
Ammoniacum.	Chloroformum.
Assafœtida.	Creasotum.
Argenti oxidum.	Galbanum.
Belladonna.	Lobelia.
Cajuputi oleum.	Moschus.

Olibanum.
Potassii bromidum.
Ruta.
Sodæ valerianas.
Spiritus ammoniæ aromaticus.
Spiritus ammoniæ fœtid:
" ætheris nitrosi.
Sumbul.
Valeriana.
Zinci oxidum.
" valerianas.

239. **ANTISCORBUTICS.**—Are remedies used for the prevention or cure of scurvy. The most commonly used medicine of this class is lime juice (the expressed juice of *citrus limonum*), which is served out to sailors and emigrants on long sea-voyages. Potatoes and other fresh vegetables, more especially *cochlearia officinalis* (scurvy grass), and various acidulous plants such as *rumex*, *oxalis*, *hibiscus sabdariffa*, &c., are all useful in scurvy. Scorbutic symptoms not unfrequently appear amongst prisoners in Indian jails, and to prevent this the diet scale should contain a liberal allowance of vegetables, such as species of *amaranthus*, *sweet potato*, *yams*, *rosel*, *plantains*, *lime juice*, *amchur*,* &c. The following remedies are found useful in the treatment of scurvy :—

Acetum.
Potassæ citras.
Potassæ nitras.
Succus limonis.

240. **APHRODISIACS.**—The medicines to which this term is applied have the effect of exciting sexual desire, or increasing the venereal power. Some of the articles, such as strychnia, Indian hemp and phosphorus, seem to act through the influence they exert on the spinal cord, while cantharides appears to prove aphrodisiac by its irritating effects on the urino-genital organs. Tonics, by improving the general tone of the system, will also have an aphrodisiac effect, and in certain temperaments some alcoholic stimulants increase the sexual feelings :—

Borax.
Cannabis indica.
Cantharis.
Ferrum.
Moschus.
Nux vomica.
Phosphorus.
Strychnia.
Terebinthinæ oleum.

* This is a Bengal preparation, and consists of green mangoes which have been skinned, the stones removed, and the pulp cut up into pieces and dried in the sun.

241. **ASTRINGENTS.**—Are remedies which diminish secretion, coagulate albuminous fluids, arrest hœmorrhage, induce contraction of the capillaries and contract muscular fibre. When applied externally to stop hœmorrhage they are termed *Styptics.* The chief astringents are the vegetable and mineral acids, but narcotics, such as opium, also exert an astringent effect, chiefly by allaying nervous irritability. Alkalies also at times prove astringent, as in cases of diarrhœa by correcting acidity in the intestinal canal. The chief styptics are tincture of perchloride of iron, nitrate of silver, matico, alum and ice. The following is a list of the more important astringents, vegetable and mineral:—

Acidum aceticum dilutum.	Galla.
,, carbolicum.	Granatum.
,, gallicum.	Hæmatoxylum.
,, nitricum dilutum.	Kino.
,, sulphuricum.	Krameria.
,, tannicum.	Maticæ folia.
Alumen.	Plumbi acetas.
Argenti nitras.	Quercus cortex.
Belæ fructus.	Rosa gallica.
Borax.	Rheum.
Catechu.	Ulmi cortex.
Cupri sulphas.	Uvæ ursi folia.
Ferri perchloridum.	Vinca major.
Ferri pernitras.	Zinci acetas.
,, sulphas.	,, sulphas.

242. **CATHARTICS.**—Are medicines which quicken the action of the intestines, and thereby increase in number or quantity the alvine evacuations. They may be conveniently classified as follows:—

1. *Laxatives or aperients* which act by mildly quickening peristaltic action, and to some extent softening the fœces. The laxatives most commonly used are castor oil, manna, magnesia, magnesiæ carbonas and sulphur.

2. *Purgatives* are medicines which quicken to a considerable degree the peristaltic action of the bowels, and render the stools somewhat fluid. In this sub-class are included rhubarb, senna, aloes, sulphate of magnesia, cream

of tartar, sulphate of soda, rochelle salt, sulphate of potash and phosphate of soda.

3. *Drastic purgatives* are more vigorous in their action than purgatives, producing numerous large fluid motions, and by their irritation of the intestinal canal exciting a derivative action. Those most commonly used are jalap, scammony and colocynth.

4. *Hydragogue Cathartics* are medicines which render the motions very fluid or watery, by greatly increasing the secretion from the mucous surface of the bowels. They are used in dropsies and other diseases in which it is thought desirable to withdraw a large amount of fluid from the circulation, and to excite a powerful revulsive action. Elaterium and croton oil are the chief remedies of this class, and must be used with caution especially in debilitated subjects.

5. *Cholagogues* are medicines which appear to increase the flow of bile into the intestinal canal, as well as to have a purgative action. It is not clear that they exert any direct influence on the liver, but they would seem to stimulate the gall-bladder and ducts to pour their contents into the duodenum. The most notable cholagogues are preparations of mercury (blue pill, calomel and grey powder) podophyllum, rhubarb, chloride of ammonium and aloes.

The action of purgatives is sowewhat modified by the substances with which they may be combined. Thus the sulphate of iron increases the action of aloes, and aromatics and hyoscyamus render the action of drastic purgatives less disagreeable and more safe. Again, ipecacuan increases the action of some purgatives, and camphor renders colocynth more active. The time required for the action of different purgatives varies very much. Thus podophyllum requires from 10 to 14 hours, while croton oil will act in 1 or 2 hours. Jalap, scammony, epsom salts and senna operate in from 3 to 4 hours, and castor oil and rhubarb in from 4 to 5. Purgatives are contraindicated during the flow of the catamenia, in pregnancy and in inflammation of the stomach or intestinal canal. When it is desirable to produce a speedy and brisk purgative action and the patient is unable or unwilling to swallow, as in apoplexy or mania, the desired object may be gained by

placing one or two drops of croton oil on the base of the tongue:—

Aloe.	Podophylli resina.
Cambogia.	Podophyllum.
Cassiæ pulpa.	Potassæ acetas.
Colchicum.	,, sulphas.
Colocynthis.	,, tartras.
Crotonis oleum.	,, ,, acida.
Elaterium.	Prunum.
Fel bovinum purificatum.	Rhamni succus.
Hydrargyrum cum creta.	Rheum.
Hydrargyri subchloridum.	Ricini oleum.
Jalapa.	Scammonia.
Magnesia.	Senna.
Magnesiæ carbonas.	Sodæ phosphas.
,, sulphas.	,, sulphas.
Manna.	Soda tartarata.
Mel.	Sulphur sublimatum.
Nux vomica.	Tamarindus.
Olivæ oleum.	Terebinthinæ oleum.
Pharbitis semina.	

243. CAUSTICS.—Are substances which destroy the vitality of the part of the body to which they are applied, and their action is purely chemical. The term *Escharotic* is applied to the more powerful caustics, as they speedily and completely cause the death of all the tissues with which they come in contact, forming an *eschar*, which subsequently separates as a slough. The strong acids and alkalies are caustic, but being fluid their action is apt to spread beyond the parts to which they are applied. This property, although usually disadvantageous, renders them particularly serviceable in the treatment of poisoned wounds, such as snake-bite. As a rule, caustics are purely local in their action, but to this there are some exceptions as in the case of arsenious acid, which may be absorbed and produce its usual poisonous effects. The following is a list of the principal agents of this class:—

Acidum aceticum.	Antimonii chloridum.
,, arseniosum.	Argenti nitras.
,, carbolicum.	Hydrargyri nitras.
,, nitricum.	Hydrargyri oxidum rubrum.

Iodum.
Potassa caustica.
Soda caustica.
Zinci chloridum.
,, sulphas.

244. **DEMULCENTS and EMOLLIENTS.**—Are often used as synonymous terms, but it is convenient to restrict the former to substances of this kind used internally, and the latter to those applied externally. Demulcents and emollients are agents which soften or lubricate the solid tissues of the body, or which, by diminishing acrimony, protect sensitive parts from irritation. When applied to inflamed parts, when the disease is recent, they diminish the heat and pain and may induce resolution. They are also used in the more advanced stages of superficial inflammation, to relieve pain and tension and to promote suppuration. When taken internally they are absorbed, and through the medium of the circulation reach remote parts, as the urinary canal in ardor urinæ. In catarrh and various pulmonary affections they are often of signal service, and would seem to act partly by their local influence on the fauces, and partly through the blood. They are also at times useful in inflammation or irritation of the intestinal canal. Besides special medicines this class includes warm water, watery vapour, and poultices of flour, linseed, bread, &c.

Acaciæ gummi.
Adeps.
Amygdalum.
Amylum.
Cera alba.
Cetaceum.
Cetraria.
Ficus.
Glycerinum.
Glycyrrhiza.
Gracilaria lichenoides.
Hordeum.
Linum.
Mel.
Oxymel.
Oleum olivæ.
Saccharum.
Sevum.
Theriaca.
Tragacantha.
Ulmus.
Uvæ.
Vaseline.

245. **DIAPHORETICS or SUDORIFICS.**—Are medicines which increase cutaneous exhalation, or produce perspiration. They may be conveniently divided into stimulant and sedative diaphoretics. The former are indicated when there is a general coldness of the surface and languid circulation, and the latter when there is increased vascular action and morbid heat of skin. During the administration of

diaphoretics the surface of the body should be kept covered and warm, and when diaphoresis sets in care should be taken to avoid the sudden application of cold to the surface, as by exposure to draughts. The chief stimulant diaphoretics are acetate of ammonia, alcohol, ethers, chloroform, &c. The chief sedative diaphoretics are preparations of opium, ipecacuan and antimony. In India, when diaphoresis is tardy or incomplete, a bottle of iced sodawater drunk rapidly while effervescing, will often produce profuse perspiration when other more special agents have failed:—

Ammonia.
Ammoniæ acetatis liquor.
Antimonialis pulvis.
Antimonium tartaratum.
Camphor.
Guaiacum.
Ipecacuanha.
Potassæ nitras.
Sarsa.
Sassafras.
Spt. ætheris nitrosi.

246. DIURETICS.—Are medicines which increase the secretion of urine. They produce their effects in various ways. Some are absorbed and without undergoing any change are carried to the kidneys, on which they act as stimulants. Others again are decomposed in the stomach, and, passing into the circulation, stimulate the kidneys by one or more of their constituents. A third class act on the primæ viæ and secondarily by sympathy on the kidneys, and a fourth have a diuretic action by their influence on the general circulation. The action of diuretics depends to some extent on the state of the skin, a cool temperature being favourable to and a warm condition opposed to diuresis. In the administration of diuretics which are also purgative, such as turpentine and cream of tartar, care must be taken not to give them in doses which will act on the bowels, as purging, like diaphoresis, is opposed to a diuretic action. When diuresis has commenced it may be promoted by giving diluent drinks. The following is a list of the chief diuretics:—

Acidum benzoicum.
Ammoniæ benzoas.
Armoracia.
Buchu.
Cantharis.
Colchicum.
Copaiba.
Cubeba.
Digitalis.
Juniperus.

Lithia.
Mezereum.
Pareira.
Potassæ acetas.
Potassæ nitras.
Scilla.
Scoparius.
Senega.
Sodæ acetas.
Soda tartarata.
Spiritus ætheris nitrosi.
Tabacum.
Taraxacum.
Terebinthinæ oleum.
Ulmus.
Uvæ ursi folia.

247. **EMETICS.**—Are medicines which produce vomiting. This effect appears to be due in most cases to irritation of the stomach, but in some instances they act by their influence on the nervous system. Some emetics, such as tartar emetic and ipecacuanha, operate slowly, causing much nausea. They also act as powerful vascular sedatives, and induce a general relaxation of the muscular system. They are therefore often used with much benefit in the earlier stages of fever, and of some inflammatory diseases. Another class of emetics, embracing amongst other articles the sulphates of zinc and copper, produce their effects rapidly, and without inducing much nausea or debilitating the system. Such emetics are therefore employed in cases of poisoning, or when we wish to clear the stomach without creating much depression. The stimulant emetics, mustard and carbonate of ammonia, are employed in cases of debility, when emetics are indicated. Some emetics, such as tartar emetic and ipecacuan, will act if applied to any part of the body so as to become absorbed, and hence they are sometimes called *specific emetics*. Other emetics, operating by direct irritation of the stomach, have been termed *topical emetics*. Emetics should not be given during pregnancy, or to patients suffering from prolapsus uteri, hernia, aneurism or congestion of the head:—

Ammoniæ carbonas.
Anthemis.
Antimonium tartaratum.
Cupri sulphas.
Ipecacuanha.
Scilla.
Senega.
Sinapis.
Tabacum.
Zinci sulphas.

248. **EMMENAGOGUES.**—Are medicines which excite or promote the menstrual secretion. They may be divided into *direct* and *indirect*. The former have a specific action on the uterus, while the latter act by stimulating neighbouring organs or improving the tone of the system. The

direct emmenagogues are very few in number, the chief agents of this kind being ergot, rue, borax, and electricity applied locally. When amenorrhœa occurs with a state of plethora then indirect emmenagogues, such as leeches cupping or drastic purgatives, must be employed. If on the contrary it be accompanied with debility, ferruginous tonics will prove the most appropriate remedies. Many drastic purgatives, such as aloes and gamboge, by exciting the pelvic circulation, and stimulant diuretics, such as turpentine and cantharides, indirectly prove emmenagogue. Emmenagogues should never be given during pregnancy or at the period called *change of life* ;—

Actæa racemosa.	Ergota.
Aloes.	Ferrum.
Ammonii chloridum.	Iodum.
Assafœtida.	Myrrha.
Borax.	Potassii bromidum.
Cambogia.	,, iodidum.
Cantharis.	Ruta.
Castoreum.	Sabina.
Cinnamomum.	Senega.
Cubeba.	

249. **ECBOLICS** are so nearly allied to emmenagogues, that they may be considered under the same head. They are medicines which produce abortion, or cause expulsion of the fœtus by contraction of the uterus. The only certain ecbolics known are ergot and savin ; borax is also said to be so, but its action in this way is much less reliable.

250. **EPISPASTICS.**—Are substances which when applied to the skin produce irritation, inflammation or vesication, and are employed with the view of relieving the diseased condition of some internal part or organ. Some merely excite irritation and relieve by their derivative effect. Others not only produce irritation but also withdraw a considerable amount of fluid from the local blood vessels, while a third class, by the production of pustules, have often a most salutary effect on deep seated disease. Epispastics may be classified according to the nature of their effects into *Rubefacients*, *Vesicants* and *Pustulants*. The chief rubefacients are mustard, oil of turpentine and iodine. The vesicants most commonly used are cantharides, and strong solution of ammonia. The pustulants are croton oil

and tartar emetic. Epispastics should never be used during the acute stage of inflammation, as besides their local effect they act as general stimulants. Generally they are applied as near as possible to the seat of the disease, but there are some exceptions to this rule as in inflammation of the eye, when it is sometimes desirable to place the blister behind the ear, and in inflammation of a large joint, such as the knee, when it is better to place it above or below the joint. Blisters should be used only under very urgent circumstances in the cases of children in this country, as the blistered surface often becomes a troublesome or sloughing sore. When a vesicant has been applied for some time and the blister does not rise readily it may be hastened, and the patient relieved of much pain, by the application of a warm poultice.. In some persons a cantharides blister is apt to produce strangury, but this may generally be prevented, by placing a piece of oiled tissue paper between the plaster and the skin. When the blister has risen fairly the cuticle should be cut, so as to allow the serum to escape, and a dressing of simple ointment be applied. If it be thought desirable to keep the blistered surface open, this may be effected by the application of a plantain leaf, or a dressing of savin or tartar emetic ointment. In young people and others with delicate skin, it is safer not to cut the blisters, but to put on a cool dressing and allow them gradually to subside.

251. **EXPECTORANTS.**—Are medicines which increase the secretion of mucous in the bronchial tubes and air passages, and promote its expulsion. They sometimes also change the character of the secretion. They have been divided into topical and general, the former including all substances which act locally on the mucous membrane of the air passages, and the latter all those which are taken into the stomach, and operate through the medium of the circulation or by their general effects on the system. Perhaps a more convenient and practical arrangement would be their classification into *Emollient*, *Sedative* and *Stimulant*. The emollient class includes extract of liquorice, mucilage of acacia and other demulcents. The sedative class includes ipecacuanha, tartar emetic, oxide of antimony and the vapour of warm water. The stimulant class is a large one. The chief articles in it are squill, senega, balsam of Peru,

balsam of tolu, benzoic acid, carbonate of ammonia, copaiba, vapour of iodine, vapour of creasote and of carbolic acid, and vapour of ammonia. When the bronchial mucous membrane is inflamed and dry and the inflammation of an acute character, demulcent and sedative expectorants are indicated. When on the other hand the disease is chronic, and the secretion of mucous deficient or not expelled freely, stimulant expectorants should be employed. Narcotics or sedatives, such as opium conium or stramonium, are often added with much benefit to expectorant mixtures, as they diminish spasm and irritability. They should never be used, when there is excessive secretion, and the patient in a feeble condition :—

Acidum benzoicum.	Dulcamara.
Ammonia.	Galbanum.
Ammoniacum.	Ipecacuanha.
Ammonii chloridum.	Lobelia.
Antimonium.	Myrrha.
Assafœtida.	Scilla.
Balsamum Peruvianum.	Senega.
Do. Tolutanum.	Stramonium.
Benzoinum.	Styrax.
Copaiba.	

252. **NARCOTICS.***—Are medicines which by their action on the nervous system allay pain and restlessnes, and induce stupor or sleep. In their operation there are generally two distinct stages. In the first they exercise a stimulating effect, and in the second a narcotic. Sedatives are distinguished from narcotics, by their not inducing any preliminary stage of excitement. Narcotics differ very much from each other in their mode of action; some such as opium, directly produce sleep, while others, such as belladonna and stramonium, do so indirectly by relieving pain. This difference is still further indicated by other effects. Thus opium induces congestion of the brain and contraction of the pupil, whereas belladonna reduces the amount of blood in the brain and dilates the pupil. Narcotics may be divided into hypnotics and anodynes, the former being used to procure sleep and the latter to relieve pain. The chief hypnotics are opium, morphia and Indian

* Also called Hypnotics, Soporifics, &c.

hemp. The chief anodynes are belladonna, stramonium, and hyoscyamus. Bromide of potassium and of ammonium have also been classed with narcotics, but they seem rather to belong to the class of sedatives. Narcotics act best when administered at bed time, and a person habituated to their use requires a much larger dose than one unaccustomed to them. It should be remembered that young children bear narcotics very badly, the very smallest dose of opium being fraught with more or less danger to an infant:—

Æther.
Amyl nitris.
Arnica.
Atropia.
Belladonna.
Cannabis Indica.
Chloral hydras.
Chlorodyne.
Chloroformum.
Codeia.
Conium.
Croton chloral.
Dulcamara.
Hyoscyamus.
Lactuca.
Lupulus.
Morphia.
Opium.
Papaver.
Stramonium.

253. **REFRIGERANTS.**—Are medicines which allay the sense of heat in the body when it is morbidly increased, and assuage thirst. There is nothing to prove that these agents actually lower the temperature of the body, but they certainly do cause the patient to feel a cool or refreshed feeling, and are often very grateful in febrile complaints. The most popular refrigerants are grapes, oranges, and lemons. Cream of tartar too in the form of Imperial drink is very agreeable, as also is tamarind pulp diffused in water. The other refrigerants are citric, tartaric and acetic acids.

254. **SEDATIVES.**—Are medicines which have a depressing effect on the nervous or vascular system. To the nervous depressants belong conium, hydrocyanic acid, Calabar bean, bromide of potassium and bromide of ammonium. The chief vascular sedatives are green hellebore, digitalis, colchicum and aconite which act mainly on the heart, and tartar emetic and ipecacuanha which act chiefly on the smaller vessels. There is another very useful class of sedatives employed in irritability of the stomach, which appears to have an entirely local action. This section includes carbonic acid (as generated in effervescent draughts) carbo-

nate of bismuth, chloroform, creasote, solutions of potash and soda, and bicarbonates of potash and soda :—

Acidum hydrocyanicum dilutum.	Chloroformum.
Acidum carbolicum.	Colchicum.
Aconitum.	Conium.
Actæa racemosa.	Creasotum.
Amygdalum.	Digitalis.
Ammonii bromidum.	Hyoscyamus.
Antimonium.	Laurocerasus.
Atropia.	Lobelia.
Belladonna.	Physostigmatis faba.
Bismuth preparations of	Potassii bromidum.
Camphora.	Tabacum.
Cerium.	Veratria.
Chlorodyne.	Veratrum viride.

255. **SIALOGOGUES.**—Are medicines which, by their local action, stimulate the flow of saliva and mucous in the mouth. In some cases medicines, such as mercury and iodine, which produce an increase in the flow of saliva as one of their secondary effects, are also placed in this class. But as they are never administered for this purpose only, and as the increased flow of saliva is but an unimportant part of their constitutional effects, it seems better to exclude them from the list. Sialogogues are not much used in medicine, but they are frequently employed as articles of luxury. Thus, in this country, the natives chew betel-nut with a little lime wrapped in the sialogogue leaf of the pepper plant, *Chavica betle*, and the English sailor in the same way masticates a *quid* of tobacco. The officinal sialogogues are pellitory, mezereon, horse radish and mustard.

256. **STIMULANTS.**—Are medicines which, through the medium of the nervous system, increase the activity of the vital functions. In moderate doses they exalt the energy of the brain and nervous system generally, increase the force and frequency of the heart's action, promote respiration, give vigour to the muscular system, and excite the secreting system generally. When taken into the stomach they create a sensation of warmth, and stimulate the muscular coat and mucous follicles of the gastro-intestinal canal, and thus promote digestion. Applied locally and undiluted

to mucous membranes or delicate parts of the skin, they produce redness and a sensation of heat and pain. Stimulants are used generally in cases of debility for patients who have lost much blood, in chronic and also in acute inflammation, such as pneumonia, in low fevers, and in the last stages of acute disease when the patient begins to sink. In short, they are used in a great variety of diseases with the best results, and often serve the double purpose of supplying food and medicine, when the vital powers begin to flag, and the patient would be incapable of taking a sufficient quantity of any ordinary food to support life and promote recovery. As the effects of stimulants are but temporary, the dose must be repeated at short intervals. The chief stimulants are alcoholic liquors, such as wine, beer and brandy, solution of carbonate and aromatic spirits of ammonia, ether and volatile oils.

257. **TONICS.**—Are medicines administered in debility, to impart strength and vigour to the system generally. They somewhat resemble stimulants in their action, but their effects are produced more slowly and are more permanent. They differ considerably in their mode of operation. Some act by improving the digestive functions in the first instance, and thus come to give tone to the system generally. Of this kind are calumba, gentian, chiretta, quassia, beberine and the mineral acids. Others, such as cinchona and its alkaloids, nux vomica, strychnia, and oxide of zinc are nervine tonics, that is to say, give tone to the nervous system. A third class are blood restoratives, having the power of improving the quality of the blood, and thus of removing debility depending on a depraved condition of that fluid. The compounds of iron and cod-liver oil are of this kind. The use of tonics generally requires to be persevered in for some time to produce any good effects, and they are contra-indicated in acute inflammation and a plethoric state of the system.

3rd.—MODES BY WHICH MEDICINES ARE INTRODUCED INTO THE SYSTEM, &c.

Medicines may be introduced into the system in various ways, the most common channel being the mouth and stomach. The other methods are by the rectum, the respiratory mucous membrane, the skin, the superficial cellular tissue and the veins.

258. **BY THE MOUTH AND STOMACH.**—This is at once the most natural and convenient mode of administering medicines. The facility with which absorption takes place in the stomach, and with which medicines are thus introduced into the blood is very great, and there is, moreover, the advantage that many articles insoluble in water are readily acted upon by the gastric juice. The various pharmaceutical forms, such as mixture, pill and powder, in which medicines are administered by mouth have been already noticed. The great aim in framing such should be, to exhibit the chief ingredient in the way that will render it most efficient and agreeable. Still in spite of every precaution, some medicines cannot be rendered palatable or prevented from deranging the stomach, and in such cases we may resort to the enema, suppository or inunction. The due action of a medicine depends a good deal upon the time of the day that it is administered, and whether the stomach be full or empty. Thus narcotics are best administered when nature is about to seek rest in sleep, and a purgative dose will prove far more energetic, when given on an empty than a full stomach. Great attention, therefore, should be paid as to the proper period for administering medicines :—

1. Purgatives, as they are intended to operate on, the intestines, should be given an hour before or 4 hours after a meal, as if given on a full stomach they will disturb digestion, and their action be delayed and diminished.

2. Anthelmintics should be taken on an empty stomach in the morning, or after a fast of 8 or 10 hours.

3. Medicines which are apt to irritate the stomach, such as arsenic, should be taken soon after a meal.

4. Narcotics should be administered about half an hour before the ordinary time, at which the patient goes to sleep.

5. Tonics should be given an hour or so before a meal.

6. Alkalies should be taken an hour before, or 4 hours after a meal.

259. **BY THE RECTUM.**—Medicines are thus administered, either in the form of *enema* or *suppository*, when from irritability of stomach or the nauseous nature of the drug, they cannot be given by mouth. In some cases also this channel is selected when merely the local action of the medicine is desired, or when we wish to relieve a distant part by revulsion. At times too when, from great irritability or organic disease, the stomach will not receive food, nutriment is administered by enema. As the absorbent power of the rectum is less than that of the stomach, a larger dose of any drug is necessary in enema or suppository, than if it were given by mouth. The effect of the enema depends a good deal on the quantity of fluid that it contains. If bulky it is sure to be rejected, and hence when we wish it to remain and be absorbed, it should not exceed 2 ozs. for an adult. As regards the retention of an enema, a good deal also depends on the way in which it is injected and its temperature. If cold or thrown up forcibly, it is nearly certain to be rejected immediately. As a large enema is likely to excite peristaltic action in the colon and rectum, advantage is often taken of this to produce an evacuation. Fifteen or 20 ounces of water, or salt and water, at the temperature of 98°, will generally have the desired effect ; but, if not thought sufficient, castor oil or epsom salts may be added. In some cases when the enema has been resorted to in sickness, its use has been continued after the restoration of health, but as such a practice is detrimental, patients should be forbidden to employ it except under medical advice.

The *Suppository* is of a conical form, and made of such articles as will permit it to melt slowly at the temperature of the body, and favour the absorption of its active ingredients.

260. **BY THE MUCOUS MEMBRANE OF THE AIR PASSAGES.**—Medicines introduced in this way must be either in the state of vapour, spray, or very fine powder. This mode of introducing medicines is pretty frequently employed, either to obtain their general or local effects. Chloroform is administered by inhalation for the sake of its general effects, or anæsthesia, while hydrocyanic acid and creasote are inhaled to produce local effects, on the mucous membrane of the air passages. Of late too the inhalation of the fumes of sulphur has been proposed, as a remedy for phthisis. Sufficient instructions having been given under the head of *Vapor*, Chapter III, regarding the administration of chloroform, it will be unnecessary to notice this subject again. The inhalation of simple aqueous vapour is often of great service in the treatment of bronchial affections; and, in the absence of a proper inhaler, the desired object may be effected by causing the patient to hold his head over a basin of hot water, or by placing the spout of a teapot containing hot water in his mouth. The extremity of the spout should be covered with a bit of rag, so as to protect the lips from the hot metal. Powders are applied to the larynx by a method called *insufflation*. The substance to be used is first reduced to an impalpable powder, and then introduced into a glass tube or piece of quill. The tube is then placed with the end well back in the mouth, and, on a forcible inspiration being made, some of the powder is conveyed into the larynx.

261. **BY THE GENITO-URINARY MUCOUS MEMBRANE.**—Medicines are frequently applied to the urethra, vagina, uterus, and bladder, to produce their local effects. The substances thus employed may be in the fluid or solid state. Fluid medicines thus administered are called *injections* or *lotions*, and are introduced by means of a glass or pewter syringe, of convenient size and shape. Solid medicines are applied as medicated bougies, caustics or pessaries. The pessary is a vaginal suppository. The active ingredients in it should be incorporated with lard and white wax, in such proportions as that the pessary will retain its conical shape when made up, and melt when placed in the vagina. The medicines thus employed are chiefly astringents, caustics, sedatives or emollients.

262. **BY THE SKIN.**—Medicines are applied to the skin

with the view of inducing certain local effects, as in the case of counter irritants and poultices, or that they may be absorbed and pass into the circulation. It has, from time to time, been denied that absorption does take place by the skin, but the fact that the inunction of mercurial ointment, or the use of the calomel vapour bath will produce the constitutional effects of mercury clearly shows, that medicines are absorbed through this channel. At the same time it must be remarked, that medicines applied to the skin, unless when the cuticle has been previously removed by a blister, act much more slowly and less efficiently than by mouth or rectum, and consequently the dose must be larger. There are four methods of applying medicines to the skin :—

1. *Enepidermic method.*—By this method medicinal agents such as Poultices, Plasters, Lotions, Baths, &c., are simply applied to the epidermis.

2. *Intraleptic or epidermic method.*—By this process the medicines, such as ointments and liniments, are carefully rubbed into the skin.

3. *Endermic method.*—By this method the epidermis is first removed, by applying a blistering plaster or liniment. When the cuticle is sufficiently raised it is cut off with scissors, and the medicine applied to the raw surface. Alkaloids such as morphia, atropia and aconitia, and the sulphate of quinine and tartar emetic are readily absorbed in this way. On the other hand the application of such substances to the cutis often causes severe pain, and may produce ulceration terminating in an unsightly cicatrix.

4. *By the subcutaneous cellular tissue.*—Medicines are introduced by this process either by inoculation with the point of a lancet, a rather clumsy method, or with the hypodermic syringe. The syringe is of very small size, and may be made of glass or silver. The nozzle is not thicker than a coarse needle, and the syringe, if made of glass, has the body accurately graduated, so that the amount of fluid taken up or discharged is at once seen. In those made of silver the piston screws through a collar, at the upper end of the syringe, and terminates in a milled head, and one complete turn of this to the right indicates the discharge of a minim. A medicine introduced in this way is absorbed instantaneously, producing at once the full effects

of the dose, and thus its operation is much more powerful than when the same quantity is introduced into the stomach, as then some time is required for absorption. Hence the dose should be considerably less, than when administration by mouth is adopted. The effects of medicines given in this way are not merely local, for a dose of morphia injected into the arm will speedily ease pain in the leg, or induce sleep. Medicines used for subcutaneous injection must be in the fluid state. They are chiefly solutions of such powerful agents as morphia or atropia, and the solutions should be of such strength, that from 2 to 5 minims will be a sufficient dose.

Medicines have been introduced into the system by opening a vein, and injecting them directly into the circulation, but this plan is not often employed at the present day. In fact, the dangers attending the operation are such, as to preclude its use except under urgent circumstances. The chief risks are the introduction of air into the circulation, which proves instantaneously fatal, and the chance of subsequent phlebitis. Saline solutions have been injected in this way in the collapse of cholera, but with no very satisfactory results. Blood is also sometimes drawn from the veins of a healthy individual, and injected into the circulation of another at the point of death from severe puerperal or other hæmorrhage. This operation is called the *transfusion of blood.* It is attended with considerable risk, such as the admission of air into the veins and the formation of clots in the injecting apparatus.

CIRCUMSTANCES THAT MODIFY THE ACTION OF MEDICINES.

When a medicine is introduced into the system, there are various circumstances that may modify its action, and these may be appropriately considered here, as they have to be duly regarded in drawing up a prescription. They may be divided into 2 classes; viz., those pertaining to the medicine and those pertaining to the patient.

263. Circumstances pertaining to the medicine which modify its action.

1. *Organic peculiarities.*—Some medicinal plants which

in a wild state have very active properties, appear to lose these under the influence of cultivation, while others appear to be improved in quality by culture. Others again are very much affected by climate. Thus the hemp, which in India yields a powerfully narcotic resin, produces no such secretion in a temperate climate. The medicinal properties of vegetables, as has already been stated, also depend to some extent on the age of the plant and season of collection.

2. *Dose.*—The difference in the action of a medicine, both in kind and degree, according to the quantity administered, is often very remarkable. Thus tartar emetic acts as a sedative in a small and as an emetic in a full dose, while arsenic proves tonic and febrifuge in minute but poisonous in large doses. Numerous instances of a similar kind might be given. As a rule, medicines are prescribed in small doses when we wish them to act slowly and produce permanent results, and in large when we wish them to operate speedily with temporary effects. Thus we give rhubarb in small doses when we wish to secure its tonic effect, and in large when we desire it to operate as a purgative.

3. *Physical condition of a medicine.*—The state of aggregation has a very sensible effect on the action of medicines. Thus, a powder will act more speedily than a pill, and a substance in solution more quickly than either. It is also observed that the more finely a medicine in powder is divided, the more likely will it be to act efficiently and without producing local irritation. Camphor in a moderate dose in solution or very fine powder does not usually produce any disagreeable effects on the stomach, while in coarse powder it is very liable to cause irritation. Jalap too in fine powder rarely causes much griping, whereas in coarse powder there may be severe griping and even vomiting.

4. *Chemical combination.*—This has a very sensible effect on the action, both in kind and degree, of medicines. As regards its influence on the action of poisons Dr. Christison states :—

"1. That poisons which only act locally, have their action much impaired or even neutralised in their chemical combinations."

"2. That the action of poisons which operate by entering the blood, although it may be somewhat lessened, cannot be destroyed or altered in the chemical combinations." The same rules hold good, to a certain extent, regarding the action of these two classes of substances in medicinal doses. Thus the corrosive action of a mineral acid may be impaired or neutralised by combination with an alkali, but strychnia and morphia, which operate by entering the blood, will act more or less powerfully in whatever combination they are administered. It must also be remembered that by chemical combination we get products having a medicinal action more or less different from that of the ingredients. Thus by combining carbonate of magnesia with sulphuric acid, we get the energetic purgative salt sulphate of magnesia, from a mixture of acetic acid and carbonate of ammonia the acetate of ammonia, a powerful diaphoretic, and by the combination of citric acid and carbonate of soda the effervescing draught, a sedative and refrigerant.

5. *Pharmaceutical mixture.*—The substances with which an active medicine is combined in a prescription, have also a very sensible effect on its action, and a knowledge of how to take advantage of this, for the benefit of the patient, is one of the nicest points in the art of prescribing. The chief article in a prescription is called the basis, and this very frequently along with its useful, has some disagreeable, properties or effects, which it should be our object to nullify. Some articles have an offensive taste or smell which can be concealed, or nauseating or griping effects which may be prevented by the addition of others. Thus the disagreeable taste of a dose of epsom salts is obviated by the addition of a few drops of sulphuric acid, and that of castor oil by spirits of chloroform or aromatic water. Again the griping effects of senna are prevented by combining with it ginger or epsom salts, and the nauseating and griping effects of jalap are diminished by the addition of cream of tartar and ginger, as in the compound powder.

264. Circumstances pertaining to the patient which modify the action of a medicine.

1. *Age.*—When we consider the difference in size and

constitutional powers of persons at different periods of life it will at once become apparent, that the action of a medicine will be very much modified by the age of the patient. This subject will be more fully noticed hereafter, and it will therefore be sufficient to state generally here, that the dose of a medicine must be gradually increased from infancy to the adult stage, that from 20 to 60 it remains stationary, and that from 60 onwards it requires to be decreased, according to the declining powers of the individual.

2. *Sex.*—This must also be attended to in ordering medicines, as females, owing to their greater nervous susceptibility and more delicate organisation, will not bear such large doses of powerful medicines as men. During infancy and childhood this difference is not so perceptible, but after the period of puberty and during pregnancy and lactation, it requires to be carefully considered. Again purgatives are to be avoided during menstruation and during pregnancy. It must also be remembered that during pregnancy and lactation, medicines may be absorbed and produce injurious effects on the fœtus or infant.

3. *Temperament.*—The peculiar physical conformation and general constitution of the individual, known as temperament, have also a modifying influence on the action of remedies. The following are the chief varieties of temperament, and the precautions necessary to be adopted in each instance. It must be remarked, however, that we rarely find a pure example of any one kind of temperament in an individual. Generally two are blended, although one predominates :—

a. *Sanguine* :—Fair clear skin, well developed muscles, vascular activity, and active habit of mind and body. Persons of this class bear antiphlogistic treatment well, but are very susceptible of the influence of stimulants.

b. *Phlegmatic* :—Pale face, languid circulation, flabby muscular development, mental and physical torpor and the functions of the body slowly performed. Such persons when suffering from acute disease do not bear depletion well, and require to be treated with stimulating cathartics.

c. *Bilious* :—Sallow skin, dark hair, moderate muscular development, and often great decision of character, but

frequently of irritable or violent temper and gloomy disposition. Such persons will bear moderate purgation well, and being liable to diseases dependent on derangement of the digestive functions, are especially benefitted by cholagogues.

d. Nervous:—Slender form, often delicate health, rapid but weak circulation, excitability of nervous and vascular systems, and great activity of mental powers, but frequently of peevish temper and liable to sudden elation or depression of spirits. Such persons do not bear antiphlogistic treatment well, but antispasmodics, narcotics, tonics and stimulants on the contrary act on individuals of this temperament with signal efficacy.

4. *Mode of life.*—Persons living much in the open air, taking a great deal of physical exercise, consuming large quantities of food and leading a temperate life, require active treatment and large doses of medicines when suffering from acute disease. On the other hand, those leading a sedentary life, more especially if living in overcrowded cities and poorly fed, do not bear active treatment or powerful medicines well. The same holds true with regard to those of intemperate habits, or individuals indulging in luxury or debauchery.

5. *Habit.*—When an individual has been accustomed to the use of some medicine, such as opium, for a length of time we find that in order to produce the full effects of the drug, the dose requires to be increased. In other words, habit, as a general rule, diminishes the influence of a medicine on the system. This is more particularly the case as regards narcotics, sedatives and stimulants, and allowance for the effect of habit must be duly made in prescribing such medicines. Thus if it were necessary to prescribe a stimulant, say sherry, for a person accustomed to consume large quantities of alcholic liquors, the dose of wine, to ensure its beneficial effects, would require to be much larger, than if the patient had been a person of abstemious habits. The effects of habit are particularly manifest in the case of opium, whether it be taken for the relief of pain or for the mental excitation of the opium eater. The confirmed opium eater, in course of time, comes to take as much of the drug at a dose, as would prove fatal

to a person not accustomed to its use. There are some exceptions, however, to these effects of habit. Thus iodine when administered for a long time often begins to prove inefficient, but its beneficial effects may again be secured by diminishing the dose, or by discontinuing its use for a week or more. Dr. Cullen too pointed out, that when castor oil is daily used to open the bowels, the dose may be gradually diminished to a couple of drachms, and yet prove equally efficient.

6. *Disease.*—Disease has often a powerful influence in modifying the effects of medicines. Thus there is a remarkable tolerance of ipecacuanha in acute Dysentry, of tartar emetic in Pneumonia, of opium in Tetanus, and of mercurials in some Fevers. During the cold stage of cholera too a large amount of opium may be given without producing any visible effect, but it should be remembered, that if the drug remains in the stomach until reaction takes place it will be absorbed, and if an overdose has been given, the patient may die from its effects. It is also a noticeable fact, that medicines requiring an alkali to dissolve them, will not act in the absence of bile in the intestinal canal, as for instance in Jaundice.

7. *Mind.*—That the mind has considerable influence on the action of certain medicines, is a fact well known to all practitioners. Thus if a patient be told that the pills he is to take are purgative, their action will in most instances be thereby promoted, and the same holds good as regards diuretics. Indeed even without the aid of medicines, defecation and micturition may be induced at the desire of the individual, when there is no particular call for the acts, and many of our bodily functions may be stimulated by attention being directed to them. From this we learn, that it is often beneficial to let the patient know the kind of action, which the medicine he is taking will produce. It is also a well known fact, that the benefit said to result from some quack remedies is chiefly produced by the patient having a firm faith in their efficacy. It is always, therefore, of great importance for the honest and scientific practitioner, to secure the confidence of his patient in his remedies and mode of treatment. Such a faith and a cheerful and happy frame of mind greatly promote recovery, while depressing emotions may render nugatory

the most skilful treatment, and most efficient remedies. The effects of narcotics and stimulants are also greatly modified, by the condition of the mind. When under the influence of an exciting passion, such as anger, a dose of opium which in a calmer mood would have induced sleep, will be found to have little or no effect. On the other hand when the mind is depressed with grief or fear, stimulants fail to have their wonted effects.

8. *Idiosyncrasy.*—This term is used to denote the irregular or anomalous action of certain medicines, in the case of some individuals. Thus an ordinary dose of opium will in some persons produce unusual and disagreeable effects, while in others an excessively large dose is necessary, to induce the usual narcotic influence. And so it is with mercury and several other remedies. The same holds good with regard to food, there being a good deal of truth in the adage, that " what is one man's meat may be another man's poison." When peculiarities of this kind are known, they must be attended to in prescribing.

4th.—THE PRESCRIPTION AND RULES FOR PRESCRIBING.

265. **THE PRESCRIPTION.**—A prescription is an extemporaneous formula, written by some one possessing a knowledge of medicine, to guide the dispenser in preparing a suitable remedy for a patient. To prescribe well requires a thorough acquaintance with therapeutical science, and also a knowledge of pharmacy and chemistry. Prescriptions in France are written in the language of the country, but in England, and in this country, partly or altogether in Latin. There are several advantages attending the use of Latin, the chief of which are, that the name of a drug in that language is more definite than in any other, and more generally intelligible. A prescription consists of the following parts :—

The Superscription.
„ *Inscription.*
„ *Subscription.*

266. **THE SUPERSCRIPTION.**—Consists of the letter **R**, and is a contraction for the Latin word *Recipe, take.* The sign **R** is a modification of the astrological symbol for Jupiter, and was doubtless originally intended as an invocation of the aid of that deity, to render the prescription efficacious. According to the construction of the Latin language the word recipe (**R**.) requires the following noun to be in the accusative, and again the noun succeeding and governed by that must be in the genitive. Thus we do not write **R**. Aqua Calcis Unciæ duæ, but *Aquæ* Calcis (genitive) Unci*as* du*as* (accusative), which means, *take two ounces of Lime water.* In practice we do not write at full length the quantities of the articles ordered, but use certain signs. In the present instance we would instead of writing Uncias duas, use the symbols oz. ii. It must, however, be recollected, that these signs have the same power as the entire words, and that consequently the names

of the medicines ordered must invariably be in the genitive.

267. **THE INSCRIPTION.**—This contains the names and quantities of the ingredients which are to be used, and in drawing up this part of the prescription a definite method should be adopted. BASIS: First, one article the most important in the formula is selected, and this is called the *basis*. ADJUVANT: To aid the operation of the basis another medicine, the *adjuvant* (adjuvo) may then be added. This auxiliary may aid the basis in various ways. It may, when used alone, produce similar effects, and so cause the combination to act with increased energy. We have an example of this in a mixture containing the infusion and tincture of the same drug, and in pilula rhei composita in which the rhubarb powder is the basis, and the aloes the adjuvant. The adjuvant may when administered alone have a different action from the basis, and yet be capable of rendering the stomach or system more susceptible of the action of the latter, or of causing it to act in a particular manner. Thus opium renders the action of mercury on the system more certain, and in the pulvis ipecacuanhæ co. determines the action of the ipecacuan to the skin. CORRECTIVE, to cause the basis and adjuvant to operate safely, or to prevent their having any unpleasant effects, a third ingredient, termed the corrective (corrigo), must often be added. For example, in the pilula cambogiæ composita the compound powder of cinnamon is a corrective, it being used to prevent the griping properties of the gamboge and aloes. The corrective may act in any of the following ways:—

1. By chemically neutralising the offending ingredient. Thus acetic acid is sometimes given with acetate of lead, to prevent its poisonous effects on the system.

2. By guarding the stomach or system against the probably hurtful effects of the other articles. For example, by adding essential oils or henbane to purgative pill masses, or opium to iodide of mercury.

3. By preventing the fermentation or decay of the chief ingredients, as when we add tinctures to infusions.

EXCIPIENT: Lastly, to give the prescription a suitable form and bulk, a fourth ingredient is added, which is deno-

minated the excipient or vehicle. This in pills is generally some soft extract or soap, in mixtures and draughts water, in liniments spirit or oil and in lotions water.

The following is an example of a prescription containing these parts:—

℞. Podophylli resinæ gr. ss. *(Basis)*.
Extracti colocynthidis co. gr. iii. *(Adjuvant)*.
Olei menthæ piperitæ ♏. i. *(Corrective)*.
Extracti Hyoscyami gr. i. *(Excipient)*.
M.
Fiat pilula.
Signat. To be taken immediately.

It is not of course necessary that every prescription should have so many ingredients, but when it is, these are the principles that should guide the prescriber in their selection. In framing a prescription simplicity should be aimed at as much as possible, as a multitude of ingredients does not secure superior efficacy, and is any thing but indicative of superior knowledge. A very good rule is, *never to include anything for the use of which a sufficient reason cannot be given.*

268. **SUBSCRIPTION.**—This part of the prescription gives instructions to the compounder, as to the form in which the prescription is to be made up, and these should be followed by directions as to the dose and mode of using the medicine. Finally the patient's name, and the date of writing the prescription should be entered, and the document certified to by the signature of the prescriber.

269. **INCOMPATIBILITY IN PRESCRIPTION.**—The prescriber must take care not to combine in a prescription medicines which are *incompatible*. Some substances are incompatible *chemically*, that is to say, when mixed certain chemical changes take place which may render the prescription dangerous, or inert, or altogether change its action. Thus when iodide of potassium is prescribed after a long continued course of mercurials, iodide of mercury may be formed in the system and salivation sometimes suddenly induced. If alkalies be combined with opium, the morphia is precipitated in an insoluble condition, and the preparations of henbane, stramonium and belladonna are rendered inert if brought in contact with caustic alkaline

solutions. Besides chemical we have also *pharmaceutical* incompatibility, as when a tincture holding a resinous substance in solution is added to water; the *resin* being precipitated. There is, still further, *physiological* incompatibility, belladonna being in its action antagonistic to Calabar bean and opium; and hyoscyamus, stramonium and belladonna to opium. The following are some general rules regarding chemical incompatibility. Acids should never be combined with alkalies, as they neutralise them; and strong acids are very apt to decompose salts, more especially carbonates and acetates. Alkalies again decompose the salts of the metals, and those of the alkaloids. Astringent infusions produce black solutions with preparations of iron, and precipitate albumen, gelatine and some metallic oxides. As a rule salts of different substances are incompatible, for when brought into contact they are apt to form a soluble and insoluble salt, two insoluble salts or a double salt. At the same time it must be remembered, that substances which combine to form new compounds, or which undergo decomposition when brought together, are not thereby always rendered ineligible as medicines. Thus we have the liquor ammoniæ acetatis from acetic acid and ammonia, and citrate of potash resulting from the decomposition of carbonate of potash with citric acid. At one time it was supposed that any drugs which formed compounds insoluble in water were incompatible, inasmuch as such substances were considered inert. The secretions of the stomach and intestinal canal, however, are capable of dissolving many such compounds, and thus rendering them active therapeutical agents. Thus tannin forms with alkaloids compounds insoluble in water, but these are found to have the same effects on the system as the more soluble salts of the latter. The following articles should generally be administered alone in water, or in some other suitable excipient:—

Acidum hydrocyanicum dilutum.
Antimony preparations of.
Cinchonidiæ sulphas (dissolved with a few drops of acid.)
Liquor arsenicalis.
„ arsenici hydrochloricus.
„ calcis.

Liquor iodi.
„ morphiæ hydrochloratis.
„ „ acetatis.
„ potassæ.
„ ferri perchloridi.
„ „ „ fortior.
„ „ pernitratis.
„ „ persulphatis.
Potassæ acetas.
Potassii bromidum.
„ iodidum.
Quiniæ sulphas. } (dissolved with a few drops of
Quinidiæ sulphas. } acid.)
Tinctura ferri acetatis.
„ „ perchloridi.
Tinctura iodi.
Zinci acetas.

List of Incompatibles.

270. The following list of incompatibles will be found useful in prescribing, and a reference to it may explain to the dispensing chemist why the ingredients of some prescription have produced unexpected results, in the mixture or lotion under preparation.—

Drugs.	*Incompatibles.*
Acaciæ gummi ...	Alcohol, ether, ammonia, acetate of lead, mineral acids, borax.
Acetum ...	Ammonia, all the alkalies and their carbonates.
Acidum arseniosum ...	Salts of iron, and magnesia and lime water, and astringent infusions.
Acidum citricum ...	Alkaline carbonates, acetates, and Tartrate of potash.
Acidum hydrochloricum..	Salts of silver and lead, and alkalies and their carbonates.
Acidum hydrocyanicum dilutum ...	Salts of silver, copper, and iron, and the red oxide of mercury.

Acidum nitricum ...	Alkalies, oxides, sulphate of iron, acetate of lead, alcohol, and all carbonates.
Acidum phosphoricum dilutum ...	Lime water, and carbonate of soda.
Acidum sulphuricum ...	Alkalies and their carbonates, and salts of lead and lime.
Acidum tannicum ...	Mineral acids, alkalies, salts of antimony, lead, silver, and persalts of iron, and gelatine.
Acidum tartaricum ...	Alkalies, salts of potash, of lime, of mercury, and of lead, and vegetable astringents.
Alumen ...	Alkalies, vegetable astringents, preparations of lead and mercury and all astringent infusions.
Ammonii bromidum ...	Acids and acid salts, and spirit of nitrous æther.
Ammonii chloridum ...	Alkalies, alkaline earths, and their carbonates, and lead and silver salts.
Ammoniæ acetatis liquor.	Acids, carbonates of potash and soda, lime water, salts of lead and silver, and metallic sulphates.
Ammoniæ carbonas ...	Acids, acidulous salts, and lime water.
Spiritus ammoniæ aromaticus ...	Acids, and acidulous salts.
Antimonium tartaratum..	Alkalies, lead salts, gallic and tannic acids and astringent infusions.
Argenti nitras ...	Solution of arsenic, alkalies and their carbonates, the chlorides and most acids, iodide of potassium, and astringent infusions.

Beberiæ sulphas ...	Astringent infusions and tinctures, alkalies and their carbonates, bromide and iodide of potassium, lime water, tartaric acid and tartrates.
Belladonna ...	Alkalies, opium, and strychnia.
Bismuthi subnitras ...	Potash, soda, ammonia, and their carbonates.
Borax ...	Mineral acids and most of their salts. Mucilage of acacia.
Calcis carbonas precipitata ...	Acid, acidulous salts and caustic alkalies.
Calcis liquor ...	Vegetable and mineral acids, alkaline and metallic salts, tartar emetic.
Cannabis indica ...	Resin of tincture precipitated by water.
Caryophyllum ...	Lime water, iron salts, mineral acids, and gelatine.
Cascarillæ cortex ...	Lime water, metallic salts, and mineral acids.
Catechu pallidum ...	Gelatine, the alkalies, and metallic salts.
Chlori liquor ...	Salts of lead and silver.
Chloroform ...	Must not be prescribed in solution in weak spirit.
Chloroformi tinctura composita ...	Must be largely diluted in water to prevent separation of chloroform.
Cinchonæ flavæ cortex ...	Gelatine, ammonia, lime water, and metallic salts.
Cinchonæ rubræ cortex...	Gelatine ammonia, lime water, and metallic salts.

Colchici cormus ...	Tincture of iodine, guaiacum and all astringent preparations.
Conii folia ...	Caustic alkalies, and vegetable acids and astringents.
Creta præparata ...	All acids and acidulous salts.
Cupri sulphas ...	Alkalies and their carbonates, lime water, mineral salts, iodides, and most vegetable infusions and tinctures.
Cuspariæ cortex ...	Mineral acids, metallic salts and sulphates, and infusions of galls and catechu.
Digitalis folia ...	Salts of iron, and of lead, tannin and all astringent infusions.
Ergota ...	Astringent metallic salts.
Ferri carbonas saccharata ...	Acids and acidulous salts, all vegetable astringents.
Ferri-et-ammoniæ citras..	Mineral acids and vegetable astringents.
Ferri-et-quiniæ citras ...	Tannic acid, and vegetable astringents, alkalies and their carbonates.
Ferri iodidum ...	Vegetable astringents, acids, acidulous salts, alkalies and their carbonates, and lime water.
Ferri perchloridi liquor fortior ...	Alkalies and their carbonates, lime water, magnesia, vegetable astringents and mucilage.
Ferrum tartaratum ...	Lime water, mineral acids, and all vegetable astringents.
Galla ...	Ipecacuanha, opium, infusions of cinchona, calumba and cusparia, the mineral acids, salts of iron and lead, sulphate of copper, nitrate of silver, carbonates of potash and soda, lime water, tartar emetic.

Gentianæ radix ...	Salts of iron, nitrate of silver and lead salts.
Granati radicis cortex ...	Gelatine, alkalies, lime water, and metallic salts.
Guaiaci resina ...	Mineral acids, spirit of ether.
Hæmatoxyli lignum ...	Tartar emetic, mineral acids, metallic salts, lime water.
Hydrargyri perchloridum ...	Soap, alkalies and their carbonates, lime water, tartar emetic, nitrate of silver, acetate of lead, albumen, iodide of potassium, decoction of bark.
Hydrargyrum cum creta.	Acids and acidulous salts.
Hyoscyami folia ...	Vegetable acids, nitrate of silver, acetate of lead, liquor potassæ and liquor sodæ.
Iodum ...	Vegetable alkaloids, ammonia, metallic salts, mineral acids.
Ipecacuanha ...	Vegetable acids, astringent infusions, salts of lead and mercury.
Kino ...	Gelatine, mineral acids, alkalies and their carbonates and metallic salts.
Krameriæ radix ...	Alkalies, lime water, salts of iron and lead, mineral acids and gelatine.
Limonis cortex ...	Mineral acids and water.
Lini semen ...	Preparations of lead and iron, and metallic salts generally.
Lupulus ...	Iron compounds.
Magnesia ...	All acids and metallic salts.
Magnesiæ sulphas ...	Alkaline carbonates, lime water, and acetate of lead.

Morphiæ hydrochloras ...	Alkalies, astringent vegetable infusions and decoctions.
Opium ...	All vegetable astringents, the alkaline carbonates, lime water, salts of lead, iron, copper, mercury and zinc, and liquor arsenicalis.
Pareiræ radix ...	The persalts of iron, salts of lead, and tincture of iodine.
Plumbum ...	Lead salts are decomposed by sulphates, carbonates, phosphates, sulphuric acid and preparations of opium.
Potassii bromidum ...	Acids, and the salts of most metals.
" iodidum ...	Sweet spirits of nitre, subnitrate of bismuth, decoction of liquorice, vegetable preparations containing starch, any acid preparations, and the salts of most metals and earths.
Potassæ caustica and Liquor potassæ ...	Acids, acidulous salts, metallic salts, the preparations of ammonia, belladonna, henbane and stramonium.
Potassæ sulphas ...	Acetate of lead and tartaric acid.
" tartras acida ...	Acids, acidulous salts, alkalies and most metallic salts.
Quercûs cortex ...	Gelatine, alkaloids, mineral acids, alkalies, metallic salts.
Quiniæ sulphas ...	Astringent infusions, alkalies and their carbonates.
Sarsæ decoctum ...	Alkalies.
Spiritus ætheris nitrosi ...	Tincture of guaiacum, emulsions, iodide of potassium, sulphate of iron, alkaline carbonates and ammonii bromidum.

Stramonii folia et semina.	The mineral acids, caustic alkalies, metallic salts.
Ulmi cortex ...	Gelatine, sulphate of iron, acetate of lead and nitrate of silver.
Uvæ ursi folia ...	Alkaloids, iron salts, lead salts, nitrate of silver.
Zincum granulatum ...	Astringent vegetable infusions, alkalies and their carbonates, lime water, acetate of lead, nitrate of silver.
Zinci valerianas ...	Vegetable astringents, all acids, soluble carbonates, most metallic salts.

271. **HOW TO DRAW UP THE INSCRIPTION.**—One of the greatest difficulties to the beginner is, how to apportion the quantity of each ingredient in a compound prescription, which will contain a number of doses. Having settled in his mind the articles to be included, he must next determine the dose of each ingredient and how many doses the prescription is to contain, and the quantity to be given in each dose. Say it is a diaphoretic mixture, to contain liquor ammoniæ acetatis, vinum ipecacuanhæ, tinctura opii. and aqua camphoræ. The prescriber may then determine, we shall say, to give in each dose 2 drachms of the first article, 20 minims of the second, 3 minims of the third, and a sufficient quantity of the last to form a suitable vehicle for the other ingredients. He then decides how many doses the mixture is to contain, and 6, 12 or 24 will be found very convenient numbers. Say he decides on 12, and that the bulk of each dose is to be one ounce, the prescription will then, by a little mental arithmetic, stand as follows :—

℞. Liquoris ammoniæ acetatis (2 dr. × 12) = 24 dr. or 3 oz. ...	℥ iii.
Vini ipecacuanhæ (20 ♏ × 12) = 240 ♏ or ½ oz.	℥ ss.
Tincturæ opii (3 ♏ × 12) = 36 ♏ ...	♏ xxxvi.

Aquæ camphoræ enough to make up with the other ingredients 12 oz. ... } ℥ viii. ss.

The same process should be followed in writing all prescriptions containing a number of doses. As to the bulk of the dose it should rarely exceed 2 oz. for a mixture or draught, and $\frac{1}{2}$ oz. is perhaps the most convenient size for a dose of the former. Pills, as already stated, should weigh 5 grs., and one, or two at most, should constitute a dose. The following are the signs or symbols used in the inscription to denote the quantities of the medicines :—

♏	*Minimum*, or minim.
gt.	*Gutta*, or a drop.
fℨ.	*Fluidrachma*, a fluid drachm, $\frac{1}{8}$th of an ounce.
℥.	*Uncia*, an ounce, 437·5 grains.
f℥.	*Fluiduncia*, a fluid ounce, 8 fluid drachms.
℔.	*Libra*, a pound, 16 ounces.
O.	*Octarius*, a pint.
C.	*Congius*, a gallon.
āā.	*Ana*, of each.
ss.	*Semis*, a half.
q. s.	*Quantum sufficiat*, as much as is necessary.

The Latin numerals are always employed to denote the quantities of the several articles. Sometimes in writing the excipient, when to make up the desired bulk would necessitate the use of fractional parts of an ounce, we write *ad* and then put down the whole quantity necessary to make up the mixture to the desired bulk. The signs and numerals in the inscription should be written with the greatest care, as an additional flourish added to the sign ℨ may cause the dispenser to mistake it for ℥. It may also occur that a carelessly written v. may be taken for x. Indeed the whole of the inscription should be written as plainly as possible, so as to obviate all risk of mistakes. It has been truly said, "that the *reading* of a prescription frequently requires more skill and judgment than *compounding it*," owing to bad writing. Pen and ink, when procurable, should always be preferred to pencil, as prescriptions written with the former are more distinct, and less liable to be obliterated than those in pencil.

272. **THE SUBSCRIPTION** contains directions for making up the prescription, and intimates the form in which it is to be prepared. The most constant part of the subscription is the letter M, a contraction for misce, *mix*, which should be written on the right hand side of the paper, immediately under the column of signs and figures of the inscription. Sometimes the letters M. S. A. are used. They are contractions for *Misce secundum artem*, *Mix according to the rules of the (pharmaceutical) art*, and intimate that special skill and care are required in compounding. The following terms are also used in the subscription, to direct the dispenser as to the particular form in which the medicine is to be made up, &c.

Divide in pilulas xii. Divide into 12 pills.

Divide in pulveres xii. Divide into 12 powders.

Fiat cataplasma. Make a poultice.
,, *collyrium.* Make an eye wash.
,, *emplastrum.* Make a plaster.
,, *emplastrum.* viii. × iv. Make a plaster, size 8 × 4 inches.
,, *emplastrum hujus figuræ et magnitudinis.* Make a plaster of this size and shape (indicated by a sketch on the paper).
,, *enema.* Make an enema.
,, *gargarisma.* Make a gargle.
,, *haustus.* Make a draught.
,, *linimentum.* Make a liniment.
,, *lotio.* Make a lotion.
,, *massa.* Make a mass.
,, *massa in pilulas* vi. *dividenda.* Make a mass and divide it into 6 pills.
,, *massa et divide in pilulas* vi. Make a mass and divide it into 6 pills.

Fiat mistura. Make it into a mixture.
,, *pilula.* Make it into a pill.
Fiant pilulæ viii. Make 8 pills.
Fiat pulvis. Make it into a powder.
,, *pulvis et divide in chartulas* vi. Make it into a powder and divide it into 6 papers (or parts.)
,, *suppositorium.* Make it into a suppository.

Fiant suppositoria iii. Make 3 suppositories.
,, *trochisci* xii. Make 12 lozenges.
Mitte hirudines xii. Send 12 leeches.

Mitte emplastrum vesicatorium (or *epispasticum*) *hujus figuræ et magnitudinis.* Send a blister of the size and figure here indicated (by an outline on the paper.)

Then follow the directions as to the administration of the medicine, which should be written in English, and give full and plain instructions as to the quantity to be taken at a time, and the periods at which the doses should be administered. All dangerous medicines for external use should be marked *Poison*, or *For external use only*. As patients are not usually possessed of graduated measures, it is the practice to order the dose to be measured in some common domestic utensil, such as a spoon. The following table gives the approximate capacities of domestic measures :—

A tea-spoonful	=	1 f. drachm.
A dessert-spoonful	=	2 f. drachms.
A table-spoonful	=	½ f. ounce.
Half a wine-glassful	=	about 1 f. ounce.
A wine-glassful	=	,, 2 f. ounces.

The following are more seldom used.

A tea-cupful	=	5 f. ounces.
A breakfast-cupful	=	8 f. ,,
A tumblerful	=	10 to 12 f. ounces.

Below the directions for taking the medicine and on the left hand side of the paper, the name of the patient and the date of the prescription should be legibly written. Finally on the right hand side the physician should sign his name, to satisfy the dispenser that the prescription has been written by some one qualified to order medicines, and to enable him to communicate with him, should that be necessary before sending out the medicine. The following example will show all the parts of a prescription alluded to :—

Superscription :—℞.

Inscription. {
Infusi Chiratæ ℥ x. *Basis.*
Tincturæ Nucis vomicæ ʒ ii. *Adjuvant.*
,, Cardamomi compositæ ℥ i. *Corrective.*
Aquam—ad ℥ xii. *Excipient.*

Fiat Mistura M. *Subscription.*

Sigt. Half a wine-glassful 3 times a
day, an hour before meals.

D. Smith, M.D.

For Mr. Jones,
Madras, 28*th July*, 1869.

Having completed the prescription the prescriber before parting with it should read it over carefully, to see that it is all correct, and so written as to obviate the risk of any mistake on the part of the dispenser.

The following tables of substances, classified according to the forms in which they may be prescribed, will perhaps prove useful.

Substances which may be used in the Fluid form.

Dissolved in Water.

1. Soluble in distilled water.

Acaciæ gummi.
Acidum carbolicum.
,, citricum.
,, tannicum.
Alumen.
Ammoniæ benzoas.
,, phosphas.
Ammonii bromidum.
,, chloridum.
Antimonium tartaratum.
Argenti nitras.
Atropiæ sulphas.
Beberiæ sulphas.
Borax.
Cupri sulphas.
Ferri et ammoniæ citras.
,, quiniæ citras.
,, iodidum (almost entirely.)
,, sulphas.
,, ,, granulata.
Ferrum tartaratum.
Magnesia sulphas.
Potassæ acetas.
,, bicarbonas.
,, carbonas.
Potassæ chloras.
,, citras.
,, nitras.
,, permanganas.
,, sulphas (sparingly).
,, tartras.
,, ,, acida (sparingly.)
Potassii bromidum.
Potassii iodidum.
Soda tartarata.
Sodæ acetas.
,, arsenias.
,, bicarbonas.
,, carbonas.
,, phosphas.
,, sulphas.

2. Requiring the addition of an acid, spirit or mucilage, or some other substance to form a proper solution in water.

Acidum arseniosum.	...Carbonate of potash or acid hydrochlor. dilut.
Acidum gallicum	...Requires spirit.
Aconitia	... „ „
Atropia	... „ „
Balsamum peruv.	... „ yolk of egg or gum.
„ tolutan.	... „ „ „
Camphora	... „ spirit.
Chloroformum	... „ „ or yolk of egg.
Copaiba	... „ mucilage.
Creasotum	... „ glacial acet. acid.
Digitalinum	... „ spirit.
Extractum cannabis indicæ.	„ mucilage or yolk of egg.
„ picis liquidum..	„ „ or honey.
Ferri arsenias	... „ acid. hydrochlor. dil.
Hydrargyri perchloridum..	„ chloride of ammonium.
Iodum	... „ iodide of potassium.
Kamala	... „ mucilage.
Morphiæ acetas	... „ acetic acid.
„ hydrochloras	... „ acid. hydrochlor.
Oleum ricini	... „ mucilage and spirit.
„ terebinthinæ	... „ „ or yolk of egg.
Plumbi acetas	... „ acetic acid.
Quiniæ sulphas	... „ an acid.
Scammonia	... „ milk.
Strychnia	... „ acid. hydrochlor.
Tinctura cannabis indicæ...	„ mucilage.
„ zingiberis fortior...	„ „

Substances suited for the form of powder.

Bismuthi subnitras.
Calcis phosphas.
Calumbæ pulvis.
Cubebæ „
Digitalis pulvis.
Ferri carbonas saccharata.
„ oxidum magneticum.
„ phosphas.
Ferrum redactum.
Hydrargyri subchloridum.
Hydrargyrum cum creta.
Ipecacuanhæ pulvis.
Jalapæ pulvis.
Pareiræ pulvis.
Powders, all the officinal.
Zingiberis pulvis.

SUBSTANCES SUITABLE FOR THE FORM OF PILL (excepting those for which there are officinal formulæ).

Acidum arseniosum.	Ferri sulphas.
,, gallicum.	Ferrum redactum.
,, tannicum.	Hydrargyri iodidum viride.
Antimonium tartaratum.	Ipecacuanhæ pulvis.
Argenti nitras.	Morphiæ acetas.
,, oxidum.	,, hydrochloras.
Camphora.	Moschus.
Cupri sulphas.	Podophylli resina.
Digitalis pulvis.	Zinci valerianas.

273. **POSOLOGY.**—Treats of the regulation of the doses of medicines according to age, sex and other circumstances already noticed. The most popular table of doses is that of Gaubius. In it the dose for an adult is regarded as the unit, and the following fractions of that are allowed for different ages :—

Suppose the dose for an adult to be 60 grs.

Under	1 year	the dose	will be	$\frac{1}{12}$	or	5	grs.	
,,	2 years	,,	,,	$\frac{1}{8}$	or	$7\frac{1}{2}$	,,	(say 8).
,,	3 ,,	,,	,,	$\frac{1}{6}$	or	10	,,	
,,	4 ,,	,,	,,	$\frac{1}{4}$	or	15	,,	
,,	7 ,,	,,	,,	$\frac{1}{3}$	or	20	,,	
,,	14 ,,	,,	,,	$\frac{1}{2}$	or	30	,,	
,,	20 ,,	,,	,,	$\frac{2}{3}$	or	40	,,	

From 20 to 60 the full dose.

The above table does not provide for the reduction which requires to be made, in most cases, during the first year of life according to age in months. Supposing the dose for an adult to be, as above, 1 dr., then the following modifications would have to be made :—

Under	1 month	the dose	will be	$\frac{1}{60}$	or	1	gr.
,,	3 months	,,	,,	$\frac{1}{30}$	or	2	grs.
,,	6 ,,	,,	,,	$\frac{1}{20}$	or	3	,,
,,	9 ,,	,,	,,	$\frac{1}{15}$	or	4	,,

From 9 to 12 months the dose will be 5 grs.

After the age of 60, the dose requires to be diminished again, according to the strength of the individual. Dr. Young gives a simple formula for calculating doses for children under 12 years of age, which is applicable in the case of most medicines. It consists in placing the age as the numerator, and the age + 12 as the denominator of a fraction. The resulting fraction gives the appropriate dose. Thus child's age :—

$$\frac{1 \text{ year}}{1 + 12} = \frac{1}{13} \text{ of dose for an adult.}$$

$$\frac{2 \text{ years}}{2 + 12} = \frac{1}{7} \quad \text{,,} \quad \text{,,}$$

$$\frac{3 \text{ years}}{3 + 12} = \frac{1}{5} \quad \text{,,} \quad \text{,,}$$

$$\frac{4 \text{ years}}{4 + 12} = \frac{1}{4} \quad \text{,,} \quad \text{,,}$$

and so on up to the age of 12.

As a rule preparations of opium should not be given to infants under 3 or 4 months of age; and even after that they should be administered to children in very small doses, and with the greatest caution.

CHAPTER V.

Dispensing of Medicines.

274. Dispensing is the art of compounding medicines according to prescriptions, and of making the more common pharmaceutical preparations described in Chapter III. This art can only be acquired by practice, under the guidance of some qualified teacher, but it will be necessary to offer a few suggestions here regarding its various operations. The dispenser should study to be expert, cleanly, methodical and, above all, accurate in all that he does. There is a right and a wrong way of doing everything, even of removing the stopper from a bottle, and he should when in training seek to acquire the proper method. Slovenly modes of manipulation are much more easily acquired than got rid of, and the student who will not take the trouble to make himself a proficient in the art, will find that the neglect renders his duties in after-life difficult and disagreeable, if it does not entail worse consequences.

275. APPARATUS AND FURNITURE.—In Chapter I. an account has been given of the various articles required for dispensing and storing medicines, and it now only remains to impress on the dispenser the necessity for maintaining an arrangement, which will secure a place for everything and keep everything in its place. This will be found to save much time and even prevent mistakes. The person in charge of a dispensing room should, therefore, arrange every article that it contains in the neatest manner possible, and in such a way as that he will at once be able to put his hand on anything when it is required. Nothing can be more ridiculous than to see a dispenser hunting about for an article, which he should be able to find at once. Each class of medicines, such as acids, tinctures or salts, should, if possible, be kept in bottles of the same size and shape, and all the articles of one class should be ranged together. Such system will greatly expedite dispensing and obviate the risk of mistakes, which sometimes arise from bottles being jumbled on the shelves, or put in situations where they have not been usually placed. It will also give to superiors who may visit the dispensing

room the assurance, that everything is conducted in a careful and orderly manner.

276. **METHOD.**—As already remarked there is a right and a wrong way of doing everything, and if the dispenser acquires the former and adheres to it, he will find his work much more agreeable, and be able to get through it with greater facility. In the remarks which follow, regarding the preparation of the various officinal and extemporaneous formulæ, general instructions as to the proper method of compounding them will be given, but there are many things which can only be learnt from practical lessons. The dispenser should, therefore, when learning the art acquire the method of performing in a proper manner every operation of pharmacy, and never deviate from that when conducting his duties. As an example of what is meant the mode of compounding the following mixture in a methodical manner may be described :—

℞. Misturæ gentianæ co. ℥ v.
Spiritus ammoniæ aromat.
Aquæ ā ℥ ss.
Fiat mistura. M.

Half a wine-glassful 3 times a day.

The first thing to be done by the dispenser is to read over the prescription carefully. He should then consult the pharmacopœia as to the composition of the compound gentian mixture, and calculate the proportion of each ingredient in it which will be required for 5 ounces. He will next weigh and measure these ingredients, and follow the directions of the pharmacopœia as to the mode of making the preparation. While it is macerating he will select and clean a bottle to hold the mixture, and put on it a proper label, exhibiting the name of the patient and directions as to how he is to make use of the medicine. When the compound gentian mixture is ready it should be poured into the bottle, then the water and lastly the aromatic spirit of ammonia, it being a rule to add any volatile preparation after all the other ingredients of a mixture or draught have been put in.

277. **CLEANLINESS.**—Cleanliness is as indispensable in dispensing as in chemical analysis, and a dirty dispensing

room is a sure sign of a careless and inaccurate dispenser. The requisites for cleanliness are a supply of pure water and of clean towels, one coarse and one fine. The coarse towel should be kept for removing dust or water spilt on the table, and such like purposes. Oils and ointments when spilt should be mopped up with a piece of blotting paper or rag, while stains of syrup, extracts, or other substances soluble in water, should be washed off, and the table dried with the coarse towel. Powders should be whisked off with the towel, in such a way as will prevent them from adhering to it. The finer towel should be used for wiping bottles, measures, &c., after they have been washed. Bottles should be thoroughly washed before anything is put into them, and sometimes it may be necessary to use a little of an alkali or acid, according to the nature of the previous contents, to render them quite clean. In case of a piece of cork or of any other foreign body getting into a fluid while it is being measured, it should be removed with a spatula or piece of stick, and not with the finger; and a cork before insertion in a bottle should be softened by dipping it in water and using the squeezer, or by beating it with a piece of wood. When a prescription has been made up the utensils used should be thoroughly cleaned before being put aside, as the neglect of this rule is apt to injure some of them, and might lead also to serious consequences. Suppose, for instance, after weighing powder of opium that the scales were not wiped. It is very likely that a small quantity of the powder would adhere to the pan, and if a dose, say of Gregory's powder, were immediately after dispensed for a young child, the results might be fatal. Measures and mortars should always be washed and dried with the towel after use, and scales should be wiped after weighing, as when put away dirty they are apt to get stained or corroded. The pill machine should also be carefully wiped after use, otherwise the grooves get filled up and injured. In short the dispenser should study perfect cleanliness in all his manipulations, and never do anything which he feels would be disagreeable to the patient who is to take the medicine, if he were witnessing the compounding.

278. **AIDS TO DISPENSING.**—In the dispensing room of a large hospital, it will be found convenient to have pre-

parations in daily use ready made, if the medicines are not liable to be injured by keeping. They should be made up during spare hours, and by thus anticipating the requirements of prescriptions, the patients will have their medicines much sooner, and the dispenser get through his morning's or evening's work much more expeditiously, than would otherwise be possible. The following are some of the articles which may be made up and kept for 24 hours :—

Mistura Sennæ Composita.

Infusum Sennæ ... The addition of 1 gr. of nitre to each ounce makes it keep better. *Squire.*

„ Chiratæ.

„ Calumbæ.

Mistura Gentianæ Composita.

Decoctum Hemidesmi (Indian Sarsa).

„ Cinchonæ.

Various other infusions and decoctions when in use may also be kept ready, and it has been found that they are not nearly so apt to deteriorate when poured into bottles while hot, the bottle being filled to within an inch of the cork and the cork put in immediately. There are some preparations which may be kept for a considerable period without injury, such as the Liquor ammoniæ acetatis. The dry ingredients of various pills too may be mixed and kept in the state of powder, the excipient being added in due proportion when the pills have to be made up.

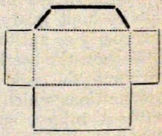
279. **READING THE PRESCRIPTION.**—On receiving a prescription the dispenser should read it slowly aud carefully, making sure that he understands it thoroughly. Should the writing not be very legible and he have any doubt as to whether he may have read it correctly, he should, before making up the prescription, respectfully make known his difficulty to the prescriber. If certain that he has mastered it correctly, he should then proceed as hereafter directed to make up the medicine. Having completed and labelled it, he should, before sending it out, again look over the prescription and be quite sure that he has put in correctly the various articles, and the quantities of each as directed. This review is very necessary,

and may prevent what might prove a fatal mistake. Should any drug in a prescription be ordered in a dose which would obviously prove poisonous, the dispenser must at once communicate with the prescriber, and refrain from informing the patient or his friends of the error. If the patient or any of his friends are waiting for the medicine, they may simply be told that it will take a little time before it can be ready. Sometimes a word may be found in a prescription which is quite legible, but which the dispenser does not understand. In such case he should refer to the pharmacopœia, or some work in which pharmaceutical terms are explained.

280. **FORMS IN WHICH MEDICINES ARE ORDERED IN EXTEMPORANEOUS PRESCRIPTIONS.**

Powder.	Mixture.	Lotion.
Pill.	Draught.	Liniment.
Suppository.	Gargle.	Ointment.
Plaster.	Enema.	

281. **POWDERS.**—Papers of various sizes accurately cut should be kept ready in the drawer of the dispensing table, for putting up powders. A package of powders is most conveniently sent out for the use of a patient, in a small envelope of paper cut as in the annexed figure. The dotted lines represent folds. As a rule, powders are ordered in numbers of 6, 10, or 12, the prescription giving the quantities of the ingredients for the whole number, and directing the compounder to mix and divide the result into the requisite number of powders or doses. Sometimes merely the ingredients for one powder are given, but with orders that several such may be sent. In this case also the dispenser should mix the quantities necessary for the whole number ordered, and divide the aggregate into the number of parts required. The ingredients of a powder should be lightly triturated in a glass or wedgewood mortar, great care being taken that they are thoroughly mixed. In putting them into the mortar the excipient or bulkiest article should be introduced first, and the smaller articles afterwards. If the excipient be very bulky and



the other ingredients small and very active, only a small quantity of the excipient should be put in at first, and the remainder added in successive portions as the mixing progresses. In every case the great object is to secure thorough mixture, and this can only be accomplished by careful continued trituration with the pestle, and the occasional use of the bolus knife to clean away the powder from the sides, and to bring it into the centre of the mortar. Having finished the mixing, the requisite number of papers for holding the powders should be arranged on the table. The contents of the mortar should then be poured out on another piece of paper, the mass shaped by a bolus knife into an oblong figure, and the whole divided into the requisite number of equal parts. One of those parts should then be transferred to each paper, and folded up. In folding, a crease is made along the long side, the opposite edge turned over and laid on that and the double paper then turned over and laid down, so that the creased edge will be about the middle of the package or beyond that according to the width desired. The ends are next turned backwards over a powder-folder (see fig. 13), which enables the dispenser to make all the little packages of exactly the same length. Should there be no powder-folder, the ends may be folded over the blade of a spatula, care being taken that the flaps are of equal length. The powders should then be put in an envelope such as that already described, and an appropriate label pasted on the back. (See label). If the powders are simply wrapped up in a piece of paper, the label should be attached to the inside of the wrapper to prevent its being lost or destroyed. Sometimes powders, such as Gregory's powder, are ordered in quantities of an ounce or more, and the patient directed to take a tea-spoonful or divide it into doses by some other simple method. In such cases the powder should be sent out in a suitable wide-mouthed bottle.

282. PILLS.—The nature of pills and the substances suited for them have already been spoken of in a previous chapter; but the details regarding them given there may again at this stage be perused with advantage by the student. Although a pill when finished looks a very simple affair, yet to make one well and expeditiously requires a

considerable amount of manual dexterity, which can only be acquired by experience. Pills are usually ordered in numbers sufficient for 2 or 3 days' use, and as in the case of powders the ingredients for one or for the whole number may be given in the prescription. In either case the dispenser should make up at one operation the entire quantity ordered. The first step in the process is to weigh out the dry ingredients, which must be in the state of fine powder. They should then be put in a mortar and triturated until they are thoroughly mixed, the same precautions being adopted as in the mixing of powders. The excipient should then be added and energetic trituration continued, until the articles have been converted into a mass of due tenacity and plasticity. Sometimes the prescriber does not order any definite quantity of the excipient, but merely writes *quantum sufficiat*. In this case the compounder must be careful not to put in too much at once. About 1 gr. of soft extract will generally be found sufficient to give the due consistence to an ordinary 5 grs. pill. Occasionally no excipient is prescribed, it being left to the option of the compounder to use whatever he may think most suitable. To select a proper excipient in such cases requires considerable knowledge, and is perhaps the most difficult part of the art of pill-making. Some articles, such as calomel, tartar emetic, antimonial powder, and ferrum redactum possess no inherent adhesiveness, and must be made up with a soft extract having the requisite degree of tenacity. Others again, although having no adhesiveness when dry, yet exhibit that quality when moist. Thus the powder of any gummy substance will become adhesive on the addition of water, and so do resins when moistened with spirit. Advantage may, therefore, be taken of these properties in making up pills. It must, however, be remarked, that if the pill consists entirely of resin it is not advisable to make it up with spirit alone, as it is apt afterwards to lose its shape. To obviate this a little of a simple powder insoluble in spirit may be added. For resins and gum-resins soap and mucilage also form suitable excipients. The latter should be added very sparingly, as pills made up with gum become very hard when dry, so much so that sometimes they will pass through the intestinal canal without being dissolved. For vegetable powders,

such as ipecacuan, rhubarb, jalap and digitalis, syrup or treacle forms an admirable excipient, obviating decomposition and preventing the pills from getting hard. In general, when using syrup or treacle as an excipient, it is advisable to add it gradually, incorporating each portion thoroughly with the mass before adding the next. When a volatile oil, such as oil of peppermint or cloves, is ordered alone in pill, the best excipient is soap, with a little magnesia. Bread crumb is not unfrequently used as an excipient for preparations of arsenic, for creasote and other active remedies, but pills made up with this substance soon get very hard.

Having made the mass, the next operation is the dividing of it into pills. The pill machine is the appropriate instrument for doing this, and as the proper mode of using it can only be acquired by practical lessons, it is not necessary to say much here regarding the method of operating. The mass is placed on the smooth part of the machine and rolled between that and the back of the cutter, until it acquires the shape of a uniform cylinder, equal in length to the aggregate diameter of the number of pills into which it is to be divided, which may be ascertained by applying it to the brass index in front of the grooves. The cylinder of pill mass is then laid on the grooves and by a few dexterous motions of the cutter is divided, and the pills discharged on the front part of the machine. If not quite round they should be rolled, one at a time, between the tips of the thumb and forefinger until they attain a finished appearance. It is usual when using the machine to dust it with some fine powder, such as magnesia or liquorice, to prevent the mass or pills from adhering to it.

When the pills have been made, they should be well coated with magnesia or liquorice powder, to prevent them from adhering to each other in the box and also to conceal their taste during deglutition.

Some patients however have such a decided repugnance to pills and all medicinal substances, that the above coating is not found sufficient to enable them to swallow them with facility. In such cases the pills may be coated with gold or silver leaf, gelatine, &c.

283. **GILDING AND SILVERING.**—The application of gold or silver leaf to the surface of pills is by no means a difficult

process. The necessary apparatus consists of two hemispheres of hard wood, polished on the inner surfaces, and fitting together so as to form when united a circular box. Into one hemisphere the requisite quantity of leaf is introduced along with the pills previously slightly moistened with mucilage, and the lid screwed on. A rotatory motion is then given to the box, and in a few seconds it will be found that the pills have acquired a bright metallic coating.

284. TO COAT PILLS WITH GELATINE.—The pills should be made in the usual way, omitting the use of magnesia or any other powder. Then take one part of gelatine and two of water and dissolve by means of a water bath; and have ready a number of straight wires about 4 inches long and pointed at one end. Next stick a pill on the end of each wire, and dip them in succession in the gelatine solution until they are completely coated. The wires should then be stuck erect in sand with the pills at the upper end, taking care that they do not touch each other. When quite dry, they may be removed from the pins, any superfluous gelatine cut off with a scissors and the wire-hole closed with a little gelatine from the end of a camel's hair brush. Such a coating completely conceals the taste and odour of the pills, and gives them a nice, dry, shining surface. It has also the advantage of preventing desiccation and decomposition, and pills when finished in this way will keep good for months.

285. COATING WITH SUGAR.—Reduce some fine white sugar to an impalpable powder by the mortar and dusting through muslin, and strew it on a pill tile. Then slightly moisten the pills with mucilage and roll them *under the tip of the fingers* on the tile in the sugar powder, until they are sufficiently coated. Pills thus covered when fresh have neither taste nor smell, but if kept for a few days the moisture and odour of the ingredients come to the surface through the sugar.

286. TO COAT PILLS WITH ALBUMEN AND SUGAR.—Take 2 saucers and cover the surface of one with a thin film of whipped white of egg. Over the surface of the other, dust a powder consisting of equal parts of sugar and gum tragacanth. Then place the pills in the first saucer and by a

rotatory motion cause them to revolve, until they have taken up a uniform thin coat of albumen. Next transfer them to the saucer containing the sugar and tragacanth, and rotate them until they have acquired a good coating. Pills covered in this way will keep for a long time, and the albumen is very readily dissolved in the stomach.

287. **HOW TO KEEP PILLS.**—If made up in large numbers and to be kept for any length of time, pills should be stored in wide-mouthed bottles with good corks. This is particularly necessary in damp climates, such as those of Burmah and the Malabar Coast. If sent out to a patient in quantity sufficient to last for a week or more, they should also be put up in a bottle, as they are very apt to get bad in the ordinary paste-board box. Some pills, such as the pilula plumbi cum opio, will not keep good more than two or three days and should always be supplied fresh.

288. **SUPPOSITORIES.**—In this country perhaps the best excipient for a suppository is a combination of wax and suet, in the proportions of about two parts of wax to three parts of suet. The first step in the process of preparing one or more suppositories is to weigh out the various ingredients. Then melt the wax and suet by a sand or water bath or gentle heat. Remove from the fire, put in the other articles and keep stirring, until the admixture has thickened sufficiently to prevent the subsidence of the active ingredients. Next remove the whole to a pill-tile, and while still soft, divide it into the requisite number of equal parts, and with a bolus knife roll each into the shape of a little cone like a pastille. The tile should be slightly moistened with oil, to prevent the suppositories from adhering to it during the rolling process. Druggists generally use moulds for making suppositories. The mass is poured into these while fluid, and on cooling the suppository falls out on inverting the mould and giving it a smart tap. Moulds of strong paper answer very well and are easily made, by having a piece of wood shaped like the suppository on which to mould and gum the paper.

289. **LOZENGES.**—In the whole of the officinal lozenges the chief excipient is sugar, and the requisite degree of tenacity is given to the mass by the addition of powder of

gum acacia and mucilage, except in the case of trochisci opii in which extract of liquorice is substituted for mucilage. The different ingredients having been mixed, according to the directions of the Pharmacopœia, the paste should be rolled out on a marble slab or clean board, on which some starch has been sprinkled, until of the required thickness. The roller should be made of hard wood and turned. It is advisable to have a small frame of wood, corresponding in thickness with the lozenge cake, to lay on the slab during the rolling, as this secures the paste being of uniform thickness throughout. A tin-plate punch of a circular or lozenge shape is used for cutting out the lozenges, and if they are found to be too heavy, the cake must be rolled thinner, and if too light, it must be made thicker. When cut out, the lozenges are placed on sieves in a hot chamber, and kept there until quite dry. They should afterwards be kept in wide-mouthed bottles.

290. **PLASTERS.**—The preparation of a plaster is one of the most difficult of the ordinary operations that fall to the dispenser. In some cases the prescriber indicates its size and shape by an outline figure drawn on the paper on which he writes the prescription, and directs attention to this by the words "*hujus figuræ et magnitudinis.*" At other times he merely gives the dimensions in inches, and states the part of the body to which it is to be applied, presuming that the dispenser knows the proper shape for the part indicated. The figures in the accompanying woodcuts, show the forms which have been found best adapted for particular parts of the body.

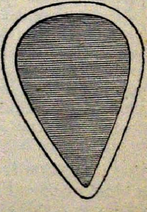


Fig. 26. For the chest.

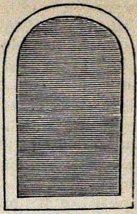


Fig. 27. Between the shoulders.

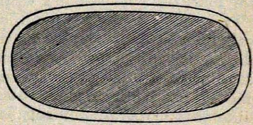


Fig. 28. For the small of the back.

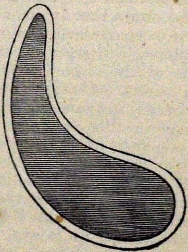


Fig. 29. Behind the ear.

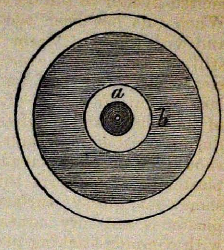


Fig. 30. For the navel in children with a tendency to umbilical hernia. The portion *b* is covered with plaster to cause it to adhere to the abdominal wall; *a* is a clear space; and the circular black portion in the centre indicates the point at which pressure is applied, by means of a rounded ivory pad or half a nutmeg.

Patterns of these forms, of the sizes most commonly ordered, should be made of paste-board or wood, and kept for marking the leather with a pencil before cutting it. Plasters are usually spread on leather, but sometimes on calico or silk. Having cut the leather of the proper size and shape, it should be secured on a flat surface with several layers of paper under it. The plaster must be melted in a clean iron vessel, with a spout and handle like that used for melting lead for bullets. When quite fluid it should be poured on the centre of the leather, and spread out uniformly with a large spatula to within half an inch of the edge of the leather, so as to leave a clear margin of that breadth all round. The margin is sometimes kept clean by placing on the leather a piece of stiff paper, having a hole in it of the size and form of the part which is to be covered with plaster. When the spreading is completed, the paper is removed, and carries with it any portions of the plaster that may have gone beyond the desired limit. Plasters are also sometimes spread by means of an instrument called the plaster-spatula. The leather is in this case also cut and placed over several layers of paper, as already described. The spatula is then put in the fire and heated, until it will cause the plaster to melt freely without scorching. The leather is then smoothed out by passing the spatula quickly over it, and it is to be observed that if too hot for the plaster it will cause the leather to shrivel. The operator then takes the roll of plaster in his left and the heated spatula in his right hand, and bringing them into contact allows the

melted plaster to fall on the leather in sufficient quantity. When this has been accomplished he lays down the roll, and with the still warm iron distributes the cooling but still plastic plaster over the leather, carefully leaving a clear margin of half an inch as already directed. This last or finishing part of the process is the most difficult of the whole, and requires great practice in order to produce a satisfactory result. When completed, the margin should be of equal breadth all round and the coating of plaster be of uniform thickness, and have a smooth and somewhat glossy surface. When the substance of a plaster is not very adhesive, the margin may be covered with common sticking plaster, which will prevent it from slipping down or falling off when applied.

Blistering Plaster.—In preparing a blistering plaster the hot iron should not be used. The leather on which the plaster is to be spread should first be coated with adhesive plaster, and on this the blistering substance should be spread with the thumb moistened with water.

Sticking Plaster.—The spreading of adhesive plaster on calico is a very difficult operation, and can only be properly accomplished with the aid of a special machine. In England hospital apothecaries and retail druggists never attempt to make adhesive plaster, but get their supplies from wholesale druggists, who make it on the large scale and in a manner which leaves nothing to be desired. In India the high temperature prevents the sending out of ready-made plaster from the medical stores, and the duty of preparing the article, therefore, falls on the dispenser. In making it the cloth should be cut into strips 6 or 7 inches wide, and about 3 feet long. Taking one of these it should be smoothly extended, by two assistants seizing the extreme ends and pulling in opposite directions. The plaster having been melted, and cooled down so as that it will not run through the cloth, should now be poured on one end of it and spread towards the other with a large ordinary spatula slightly heated. An old spatula should be kept specially for this purpose, and the plaster when spread should be in a thin uniform layer, and have a smooth surface.

Court Plaster.—Consists of a solution of isinglass spread on silk, and is sometimes called Liston's plaster. The silk

used for the purpose may be black, white or flesh-coloured, and should be tightly stretched on a frame. The following is the formula given by Parish for its preparations.

Isinglass	℥ i.
Water	℥ viii.
Dissolve with heat,	
Benzoin	ʒ ii.
Alcohol	℥ ii.

Dissolve, strain and mix the two solutions; and apply several coats of the mixture to the silk with a camel's hair brush, each layer being allowed to dry before the application of another. Then paint a layer of the following solution on the other side of the silk :—

Venice turpentine	℥ i.
Benzoin	℥ ii.

The latter application is by no means necessary, and only serves to give the plaster a more finished appearance.

291. MIXTURES.—The ingredients contained in a mixture are fluids, such as infusions, decoctions and tinctures, and solids readily soluble in water. A mixture varies in bulk. For children the quantity ranges from 1 to 4 ounces, and for adults it may be 6, 8, 12, or 20 ounces. In making up a mixture the ingredients cannot always be mixed in the order in which they are written in the prescription, and the dispenser must adopt the method which experience and a knowledge of the nature of the articles tell him, will secure the best result. Thus powders, such as chalk, rhubarb, and magnesia which do not mix readily with water, should be triturated with successive portions of the water in a mortar before being put into the bottle. Extracts and salts not readily soluble must also be treated in the same way. When a solid is readily soluble in water it should be reduced to powder, put in the bottle and solution effected by shaking. When all the ingredients are fluid, they are at once poured into the bottle and mixed by agitation, except in cases in which some process is necessary to render any of them miscible with or soluble in water. As a rule, articles ordered in small quantities, such as tinctures, should be put in first and the excipient added last. It is necessary, however, to deviate from this rule when an ingre-

dient is of a volatile nature, as in the case of chloroform, ether or hydrocyanic acid.

292. THE EMULSION.—Is a mechanical mixture 'of an oil, fat or resin, with water' produced by the aid of an alkali, gum, sugar or white or yolk of egg. We have good examples of emulsions in the officinal mistura ammoniaci and mistura amygdalæ, the natural constituents of the drug in each case producing this form of mixture, by simple trituration with water. Fixed oils, such as castor oil, may be made into an emulsion with mucilage, and the mixture is rendered more palatable by the addition of sugar and oil of peppermint, as in the following formula given by Parrish :—

Take of castor oil 1 oz., gum arabic in powder and sugar of each 3 drs., oil of peppermint gt. 4. Triturate the gum and sugar into an uniform powder, and add water 6 drs. or sufficient to bring the mucilage to the consistence of castor oil. Then add by degrees the castor oil, triturating until it forms an emulsion of a milky appearance. Should this fail to appear, add a little more water, or if the mucilage is too dilute some more gum. Dilute the result with water sufficient to make 4 oz. Lastly, put in the oil of peppermint.

The proportion of gum and sugar for converting other fixed oils into emulsion is, as in this instance, 3 drs. of each to one ounce of oil. Fixed oils may also be made into emulsion with an alkali, such as the liquor potassæ or liquor ammoniæ. When this process is adopted, the oil should be put into a bottle, with rather less than its bulk of water. Then add the alkali and shake well, when a perfect emulsion will be got which may be afterwards diluted with water. Copaiba and other oleo-resins form excellent emulsions with mucilage. For 3 drs. of oleo-resin, it requires about 1 dr. of powder of gum acacia to make an emulsion. The method of procedure is the same as in the case of a fixed oil, but the oleo-resin must be added to the gum in very small quantities at a time, and trituration diligently conducted after each addition, until the articles are completely mixed. It is also essential to add a little water from time to time, otherwise the mixture gets too thick and would ultimately become unmiscible with water.

The addition of a large quantity of tincture to an emulsion made with mucilage will cause the oleo-resin to separate, and an acid will have the same effect on one made with an alkali. Oil of turpentine is best made into an emulsion with yolk of egg, the ingredients being rubbed up in a mortar and a little water added from time to time. Chloroform may be made into an emulsion with olive oil, powder of gum arabic and sugar in equal quantities; the fluids by measure and the solids by weight.

293. **HOW TO PUT UP A MIXTURE.**—Having put all the ingredients of the mixture into a bottle corresponding in capacity with its bulk, the bottle should be corked securely, but yet not in such a way as will require the aid of a corkscrew, or render the cork liable to be broken in extracting it. The bottle should then be capped by taking two small squares of paper, one white inside and the other red or blue outside, and folding them down neatly over the cork and the upper part of the neck of the bottle. The cap thus formed is secured by a piece of string passed 2 or 3 times round the neck, immediately below the lip, and tied in a slip knot, and the super-abundant fringe of paper must be cut away neatly with a small curved scissors. Leather is usually used for capping bottles with glass stoppers, and should be damped before being applied. Good tin-foil also answers the purpose very well, and does not require string to secure it. The cork should be adjusted to the bottle before putting the mixture into it, so that if does not fit it may not be soiled. It should be slightly larger than the mouth of the bottle, and be moistened and pressed in a cork squeezer, before being put in the bottle. The label should then be applied as directed in a future page, and the bottle neatly wrapped in paper.

294. **DRAUGHT.**—The draught differs from the mixture only in the circumstance, of its being sent out in quantity sufficient for a single dose. The articles ordered in this form are such as are employed for some temporary purpose, or are apt to undergo decomposition, or of which the dose requires to be very carefully regulated. The bulk of a draught varies from ½ oz. to 2 ozs., and it should be dispensed in accordance with the instructions given under the head of *mixtures*.

295. **GARGLES, ENEMAS, AND INJECTIONS.**—These forms should be prepared in the same manner as mixtures, but great care should be taken in preparing the labels to indicate for what purpose each is intended, so as to prevent mistakes.

296. **LOTIONS AND LINIMENTS.**—The remarks regarding the dispensing of mixtures are also applicable to these. The labels attached to the bottle in either form should clearly show that the contents are for external use; and it is a very good plan to place a small label with the word, POISON, on it, a little above the larger one containing the general directions as to the use of the prescription. If a mixture and liniment are sent together to one patient, they should also be put in bottles of different colour and shape.

297. **OINTMENTS.**—All ointments, more especially those containing lard, are particularly liable to decomposition in this country, and should be kept in well closed jars, and in as cool a situation as possible. Solids are sometimes introduced into ointments, and it requires some skill and care in such instances to secure a thorough admixture of the ingredients. If the solid is soluble in a small quantity of water or spirit, it should first be dissolved with a few drops of one of these fluids, and afterwards thoroughly triturated with the fatty basis of the ointment. If it is not soluble in either of these fluids, it must be reduced to an impalpable powder, and then carefully mixed with the grease, until the ointment is of a uniform colour throughout and does not show any distinct specks of the solid.

Ointments may be mixed with a spatula on a marble slab or in a wedgewood mortar, and great care is required in the cleaning of these articles after the ointment has been made. The best way is to wipe off, as far as possible, the grease with paper or tow, and then to use a few drops of solution of potash or country soap with water, to get rid of the remainder. Ointments should be dispensed in gallipots with tops, and if sent out in those without tops they should be covered with leather or a double layer of paper, the inner one of which should be waxed.

298. **LABELLING.**—No prescription should be sent out of the dispensing room until a label has been attached

which will ensure its being used exactly as directed by the physician, and prevent the remotest chance of the patient or his attendants making any mistake. Druggists generally have blank printed forms for their labels, but as these are never supplied to Government institutions, the dispenser must write the instructions, &c., in a legible hand. The following examples will illustrate the forms which may be adopted for lables :—

THE MIXTURE

For Mr. ____________________

Take a table-spoonful every third hour.

June 12*th*, 1882.

No.

THE MIXTURE

For Mr. ____________________'s child.

A tea-spoonful three times a day.

January 10*th*, 1882.

No.

POISON

For external use only.

THE LINIMENT

For Mr. ____________________

To be rubbed in over the knee with a piece of flannel.

May 6th, 1882.

No.

THE POWDERS

For Mrs. ____________________

Take one in a little water three times a day.

August 25th, 1881.

No.

THE GARGLE

For Mr. ____________________

To be used occasionally.

November 14th, 1881.

No.

Shake the Bottle.

THE ENEMA

For Mr. ________________

To be administered immediately.

April 1*st*, 1882.

No.

PILLS

For Mr. ____________

Take one three times a day.

December 1*st*, 1881.

No.

THE OINTMENT

For Mr. ____________

To be used as directed.

February 9*th*, 1881.

No.

It will be observed that the label shows the name of the patient, the date on which the medicine was made up and a number, and with these the dispenser will have no difficulty in referring to the copy of it in the prescription book, should it be necessary to repeat the medicine. Having prepared the label it must be carefully attached to the bottle or other vessel with mucilage. The mucilage should be made of good clear gum arabic, and, the label being placed on a piece of clean paper, it should be applied with a brush, care being taken not to put on too much, otherwise when the label is pressed so as to cause it to adhere, the superfluous gum will escape and soil it. The label must be put on quite evenly, and when applied to the

glass, &c., it should be covered with a slip of clean paper larger than itself, and tightly and uniformly pressed till quite smooth.

299. **REGISTRATION OF PRESCRIPTIONS.**—All prescriptions should be carefully copied into a book kept for the purpose. Each entry should show the exact composition of the issue, the name of the patient, date of first supply and the number on the label. It is also convenient to have a *Nominal index* to the *Register*, the number of each prescription issued to a patient being entered opposite to the name. With these aids the dispenser will have no difficulty in turning up a prescription, when a repetition is ordered. The original prescription should also be filed and kept for a limited period, or returned to the patient.

300. **EXTRACTION OF FIXED STOPPERS.**—Sometimes from the imperfect grinding of the stopper or neck of the bottle, and sometimes from the deposition of resinous or gummy matter or a salt, the stopper gets fixed so firmly that considerable ingenuity is required for its removal. If bad grinding is the cause, the following means may be tried. Grasp the neck of the bottle between the base of the forefinger and of the thumb of the left hand, and then as the neck gets warmed with the heat of the hand, tap the stopper with the handle of a spatula held by the blade in the right hand. Should this not succeed, take the corner of a towel, dip it in boiling water and pass it round the neck of the bottle, which should be held in the left hand while a spatula is held in the right, and the stopper tapped with the handle in a lateral and slightly ascending direction. If this resource should also fail, then heat the neck of the bottle all round slowly and uniformly with the flame of a spirit lamp, and from time to time try to extract the stopper with the hand. Care must be taken not to heat the stopper, and the neck must be heated very gradually, otherwise the glass is apt to crack. Should the cause of the adhesion be a resin or other substance soluble in spirit, pour a small quantity of alcohol into the groove between the lip and the stopper, allow the bottle to stand a little to give the spirit time to soak in, and then try to extract the stopper. Should a gum or soluble salt be the

cause of the fixture, the effect of a small quantity of water applied in the same way as the spirit may be tried with every prospect of success. Sometimes a lever is employed for starting fixed stoppers. It consists of a piece of thick strong wood 3 × 6 inches, having six oblong holes in it somewhat larger than the tops of ordinary stoppers. Into one of these the head of the stopper, protected with a bit of cloth, is introduced, and the bottle being firmly grasped with the left hand, the lever is twisted round with the right. The power thus gained is very great, and if too much force be used the stopper will be broken.

301. **BORING CORKS.**—It is sometimes necessary to make a hole in a cork through which to pass a tube. In the absence of any other instrument a red hot iron may be used, but a hole made in this way does not grasp the tube very firmly. A rat-tail file may also be used for the purpose and answers very well, but the best instruments for the purpose are cork-borers, small brass cylinders of different sizes with a cutting edge. The cork is held in one hand and the cutting edge of the borer pressed against it with the other, and turned backwards and forwards until the hole is completed.

302. **BENDING GLASS.**—Glass tubes may be bent to any angle with the flame of a spirit-lamp. The part of the tube where the bend is to be made should be marked with chalk, and held over the flame so as to get gradually warmed. When fairly heated through several inches of its length it may be brought into contact with the flame and rotated, until it gets soft and can be bent with a slight force. The first curve should be very slight, and then another heated portion should be advanced into the flame and bent, the process being continued until the desired angle is attained.

303. **CUTTING GLASS.**—Glass, such as the body of a bottle, may be cut by heating it with the friction of a string passed round it and then plunging it into cold water. The string for producing the friction may be confined to the desired place, by a band of cord tied firmly round the bottle on each side of the part to be cut. The operator

then holds the bottle to be cut with his left hand, and one end of the friction string with his right. An assistant seizes the other end, and the string having been pulled rapidly backwards and forwards for several minutes in the groove between the bands of cord the glass gets somewhat heated. It is then plunged into cold water, which immediately causes it to crack in the desired situation. A bottle may also be cut by knocking off the top, and then applying the point of a hot iron to one of the resulting cracks and moving it slowly down to the place at which the cut is required, and then right round the bottle. The crack from which the hot iron started will thus be continued, and exactly follow its track over the glass. A bottle may also be cut across by tying round it a thread of lamp cotton soaked in spirits of turpentine, and then igniting the thread. Glass tubes are cut by making a deep scratch with a file at the part to be cut. The tube is then held in the two hands with a thumb on each side of the site of the desired fracture, and firmly bent until it breaks.

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